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PAPERS READ BEFORE THE ACADEMY

I.

THE APTERYGOTA OF THE SEYCHELLES.

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Plates I–XVIII.

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The collection of wingless insects described in this paper was made as part of the work of the Percy Sladen Trust Expedition to the Indian Ocean in 1905 and subsequent years under the leadership of Professor J. Stanley Gardiner, F.R.S., of Cambridge.

Many of the specimens were collected by Professor Gardiner himself, others by Mr. J. C. F. Fryer; but the greater part of the collection was obtained by Mr. Hugh Scott, of the Cambridge University Museum. He spent eight months on the Seychelles during the years 1908–9; and an interesting account of his methods of work, with descriptions of the various islands visited, and the nature of the mountain-forest regions from which most of the insects come, will be found in a paper (1910) published in the Linnean Society's Transactions, in which have appeared most of the results of the Sladen Expedition hitherto issued (Gardiner and others, '07–'14).

For the privilege of examining this highly interesting collection I am indebted to the kindness of Professor Gardiner, to whom and to Mr Scott my best thanks are further due for much information willingly given, and for patience under long delays due to the pressure on my time of other work. The publication of the paper by the Royal Irish Academy during war-time has been much facilitated by a grant, which is gratefully acknowledged, from the Council of the Royal Society. It is worthy of remembrance that a former Secretary of the Academy, E. Perceval Wright, made, nearly fifty years ago, a biological expedition to the Seychelles, and described some plants from the islands in our Transactions ('71).

A general account of the area in which the collection was made has been given in Professor Gardiner's paper ('06) on the Indian Ocean, and in his contributions to the Reports of the Expedition ('07–'14). The vast majority of the specimens come from the granite islands of the Seychelles Archipelago in the restricted sense; most are from the forest-clad, mountainous islands of Mahé and Silhouette, a much smaller number from the islands of Félicité and Praslin. Collections of Apterygota were also made on Coetivy to the south and on some of the coral islands to the south-west of the true Seychelles group—the Amirante and Farquhar, and Aldabra—the latter of which lie north-west of Madagascar. A discussion on the geographical bearing of the facts of distribution of the insects is given at the end of this paper (pp. 48–55).

The Apterygota are now generally recognized as a sub-class of the Insecta, showing a number of interesting primitive characters which afford a strong presumption in favour of the view that their universally wingless condition is to be regarded as a survival inherited from the remote ancestors of insects, and not as an adaptation to some abnormal mode of life like the parasitism of such insects as lice and fleas, whose winglessness is clearly a secondary character. On account of their inability to fly, and the wide and often discontinuous range of many genera and species compared with the curiously restricted distribution of others, the Apterygota may be regarded as specially important in faunistic studies which open up problems of ancient geography. The rich collections of these insects which have been gathered in the Seychelles and neighbouring archipelagoes promise, therefore, results of some importance. The two main orders of Apterygota which were recognized by Lubbock in his classical monograph ('73), the starting-point for most English-speaking students of the group, are both well represented in the collections now described. These orders can be readily distinguished by superficial characters:—

A. Feelers long, multiarticulate. Ten abdominal segments. Often eight pairs of simple abdominal appendages, . . *Thysanura.*

B. Feelers with four to six segments. Abdominal segments six only. At most three pairs of abdominal appendages, reduced or modified, ... *Collembola.*

Order THYSANURA.

The Thysanura or "Bristle-tails" are well represented in the fauna of the Seychelles. Hitherto only two species of the order—*Acrotelsa collaris* (Fab.) and *Lepidospora Braueri* Esch.—appear to have been recorded from the archipelago; both of these belong to the extensive family of the Lepismidae. In the collection now described, eight species (four of them new) of this family are enumerated, besides three of the Machilidae, and one each of the Campodeidae and the Iapygidae—all of these being apparently new. Thus the four principal families of the Thysanura have members among the insects of the Seychelles. These families are easily distinguished by readily observed structural characters.

A. Jaws projecting beyond the mouth; maxillae and labium developed somewhat as in typical mandibulate insects, with conspicuous jointed palps. A median jointed tail-process. Sub-order *Ectotrophi.*

a. Body not flattened dorso-ventrally; dorsal aspect of thorax markedly convex. Head with paired and median ocelli in addition to the large compound eyes. Abdominal segments 1-7 with exsertile vesicles, 2–9 with unjointed stylets, 10 with long jointed cerci. Family *Machilidae.*

b. Body flattened dorso-ventrally. No ocelli; compound eyes relatively small. Abdominal segments usually without exsertile vesicles (on segments 2–7 in some Nicoletiinae), stylets usually on segments 7–9 or 8-9 only (rarely 2-9), ... Family *Lepismidae.*

B. Jaws apparently retracted within the head; maxillae and labium highly modified with palps unjointed or absent. No median tail-process, ... Sub-order *Entotrophi.*

c. Cerci modified into forceps, . . . Family *Iapygidae.*

d. Cerci elongate with sensory bristles, . Family *Campodeidae.*

Family **MACHILIDAE.**

Our knowledge of the various genera comprised in this family has been vastly extended during recent years through the work of Silvestri ('04, '05, '06, '11) and Verhoeff ('10). The latter author has deemed it advisable to recognize three distinct families instead of one. While the characters used in this discrimination—the shape and extent of the abdominal sterna and the number and arrangement of the exsertile vesicles which these bear (see Plate II, figs. 19-23, 27-31 *e.v.*)—are of undoubted value in facilitating classification and indicating relationship, they are not of sufficient importance to justify family-distinctions. The Machilidae, as generally understood, form such a natural and easily recognized group of Thysanura, that Silvestri is undoubtedly to be commended for following the older entomologists in regarding the insects as constituting a single family. Verhoeff's divisions may conveniently be regarded as sub-families—to be distinguished thus—

A. Abdominal segments all with very small sterna, and bearing at most one pair of exsertile vesicles, . . . *Meinertellinae.*

B. Abdominal segments from 2nd to 7th, inclusive, with relatively large triangular sterna.
  - *a.* Only one pair of exsertile vesicles on any abdominal segment, ... *Praemachilinae.*
  - *b.* Two pairs of exsertile vesicles on abdominal segments 2–3, 2-4, 2–5, or 2–6, ... *Machilinae.*

The last-named group (Machilinae) is alone represented in the collection from the Seychelles. Three species, all new, differ so definitely from any members of the family hitherto known that a new genus is required for their reception.

Corethromachilis[1] gen. nov.

Feelers, maxillary palps, legs, and ninth abdominal stylets scaled. Apex of mandible feebly toothed. Lacinia of maxilla with a complex "brush" of lanceolate bristles. Legs of second and third pairs with coxal processes; beneath the tip of the terminal (third) segment of the foot in all three pairs a dense mass of lanceolate bristles forming a "brush" or scopula. Abdominal segments with moderately large triangular sterna, the first, fourth, fifth, sixth, and seventh with one pair of exsertile vesicles each, the second and third with two pairs each. Male with feebly jointed gonapophyses on the eighth and ninth abdominal segments; penis short, not reaching apex of the ninth sub-coxa. Female with ovipositor not, or hardly, projecting beyond ninth abdominal stylets.

Type, *Corethromachilis Gardineri* (sp. nov.) Seychelles.

This genus is of interest from the reduction to two of those abdominal segments which have two pairs of exsertile vesicles each. In the typical genus Machilis there are four segments thus provided; in Coryphophthalmus (Verhoeff, '10) three. In this character, therefore, Corethromachilis approaches Praemachilis and its allies, in which there is but one pair of exsertile vesicles on each abdominal segment from the first to the seventh, inclusive. But the most remarkable feature in Corethromachilis is found in the wonderful arrays of bristles on the lacinia of the maxilla and beneath the tip of each foot, forming the brush-like organs that have suggested the generic name. Except in the case of the aberrant *C. gibba*, described below, there is nothing to attract attention in the general appearance of the species. Indeed, the naturalist studying the Machilidae is struck with a monotony throughout the family in the main features of their superficial aspect, which is yet accompanied by a range of variation in details of the exoskeleton which afford reliable characters for classification. All the specimens of Corethromachilis were collected in mountain-forest regions, offering in this respect a great contrast in habit to most Machilidae, which delight in stony places.

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[1] From *κόρηθρον*, a broom, and Machilis.

Three species from the Seychelles are referable to this new genus; they may be distinguished by obvious characters.

A. Insects of the usual Machilid build; paired ocelli transverse.
  a. Legs and claws short, scopulae large and very dense (fig. 17). Maxillary palps longer, *Corethromachilis Gardineri.*
  b. Legs and claws long, scopulae less dense (fig. 44). Maxillary palps shorter. . . . . *C. brevipalpis.*
B. Metanotum raised into a great dorsal prominence (fig 45). Head with conical process between the eyes, paired ocelli shortly ovoid (figs. 46, 47), ... *C. gibba.*

Corethromachilis Gardineri sp. nov.

(Plates I, II, figs. 1–26.)

Paired ocelli (fig. 2 *p.o.*) of the usual dumb-bell shape, about a transverse diameter apart. Feelers more than twice as long as body (fig. 1); basal segment (fig. 2) three times as long as broad; regions of flagellum (fig. 3) with 16–18 segments each. Mandible (fig. 4), maxillula (fig. 5 *Mxl*), tongue (fig. 5 *hy*), galea of laeinia (fig. 6 *g*), and labium (fig. 12) exceptionally broad in proportion to their length. Maxillary palp one-third length of body. Legs short, claws remarkably short, and scopulae very dense (fig. 17). Stylet on second abdominal segment (fig. 20) with numerous bristles but without terminal spine. Median tail-process nearly twice as long as body; cerci half as long as body (fig. 1).

Length of body 14 mm. Colour (with scaling), dark metallic purple with white rings on feelers, cerci, and tail-process.

Localities.—Mahé: Forêt Noire district and Cascade, 1000 feet and over (August, 1905, September and October, 1908); Montagne Alphonse, Cascade, 1800 feet (December, 1905). Silhouette: forest near Mare aux Cochons, over 1000 feet (August and September, 1908). Praslin: Côtes d'Or Jungle (November, 1908). Specimens numerous in all these localities. Mr. Scott records that they all come from mountain forests, mostly among the dead leaves, both fallen and still hanging, of palms and other trees.

This species is remarkable for the lateral extension of the jaws and tongue The base of the *mandible* (fig. 4) has a strong prominence on its outer border, while the *tongue* (fig. 5 *hy*) and the *maxillulae* (fig. 5 *Mxl*) are unusually broad in proportion to their length. They show, in the main, the arrangement of parts characteristic of the Machilidae. In the *maxilla*, the galea (figs. 6 *g*, 9, 10) is remarkably broad and flattened, its free border merging into a delicate membranous ridge, strengthened by rib-like thickenings, and its outer corner bearing a group of minute sensory spines projecting from papillae (figs. 10, 11). The lacinia (figs. 6 *l*, 7, 8, 9) exhibits in perfection the large and wonderfully formed head to which reference has been made in the generic description. From the terminal teeth (*t*) a lamella (*la*) extends on either aspect, embracing a considerable cavity from whose recesses spring more than fifty lanceolate bristles forming the characteristic "brush." Such a brush, though in a far less highly developed condition, has been figured by Börner ('08, Pl. VI. fig. 11) from a Japanese species of Machilis, and by the present writer ('13, Pl. 11, fig. 6 A) in Petrobius. Börner calls the structure "der Mittelanhang." The hinder edge of the lamella (see figs. 7, 8 *la*) is produced into three prominent teeth (*t′*); its front edge (fig. 9 *la*) has a rather sinuate margin, but ends in a single, sharp, delicate tooth (*t″*). The maxillary palp (fig. 6 *p*) is of the usual form, its first segment with a strong backwardly directed conical process, its succeeding six segments with the proportionate lengths 10 : 10 : 8 : 11 : 9 : 13. The whole palp measures 5 mm. in length; the terminal segment as usual bears many strong spines. The labium (fig. 12) has a relatively broad and short sub-mentum; the terminal segment of the labial palp carries a number of rows of flattened tapering sensory spines (fig. 13).

The short claws and the dense scopulae below the terminal segment of each *foot* (fig. 17) give the insect a very characteristic appearance. The bristles of this scopula have a regular lanceolate shape towards the tip (fig. 18), but this specialized condition can be traced through a series of gradations from the ordinary bristles of the leg. The coxal process of the second leg (fig. 15) is narrower than that of the hind-leg (fig. 16).

Of the *abdominal segments*, the first (fig. 19) is remarkable for the reduced sternum, the second for the hairy, unspined stylets (fig. 20), and most of the others for the sinuate sutures between the sub-coxae and the sterna. The male genital segments (figs. 24 and 25) do not call for special remark; the *penis* (*p*) and *gonapophyses* are short; the latter show imperfect jointing, and bear numerous spines in rows along their inner faces (fig. 26). The *stylets* of the eighth and ninth segments have very long spines. In the female the gonapophyses are relatively short, with sixty-four rings on those of the eighth, and an equal number on those of the ninth, segment.

Corethromachilis brevipalpis sp. nov.

(Plates II, III, figs. 27–44; Plate V, figs. 63–6.)

Paired ocelli (fig. 35 *p.o.*) long and narrow, almost in contact centrally. Feelers longer than the body, basal segment two and a half times as long as broad (fig. 35); regions of flagellum (fig. 36) with 14–16 segments each. Jaws of typical machilid form, "brush" of maxilla less prominent than in *C. Gardineri.* Maxillary palp one-fifth length of body. Legs (fig. 43) moderately long; claws long and scopula scanty (fig. 44). Stylet on second abdominal segment (fig. 28 *st*) with short terminal spines. Median tail-process longer than body; cerci as long as body.

Length (without appendages) 15 mm. Colour of scaling rather paler than in *C. Gardineri.*

Localities.—Mahé: in the mountain forests (August and September, 1908). Silhouette: forest near Mare aux Cochons, 1000 feet (September, 1908). A number of specimens from each locality, but the species is evidently less abundant than *C. Gardineri.*

C. brevipalpis is a somewhat larger species than *C. Gardineri*, but the maxillary palp (fig. 39 *p*) is absolutely shorter and feebler than in the latter (see fig. 6 *p*). The jaws of *C. brevipalpis* differ less markedly from those of typical Machilids than do the corresponding structures in *C. Gardineri*, the *mandible* (fig. 37) and *maxillula* (fig. 38 *Mxl.*) being of the proportions usual in the family, and the galea (fig. 39, 40 *g*) of the *maxilla* being longer than broad. The lacinia (fig. 40) is furnished with a "brush," but its bristles are less numerous and prominent than those of *C. Gardineri.* The first segment of the maxillary palp has its process sub-cylindrical; the proportions of the other six segments are as 5 : 4 : 5 : 7 : 5 : 6. The *legs* are of the same general build as those of *C. Gardineri*, but longer, and the conspicuous claws, with a slight tendency to indentation along the inner edge, and the scanty scopulae (fig. 44) make discrimination between the two species easy. The *abdominal segments* and their appendages (figs. 27–34) correspond closely with those of *C. Gardineri*, except that the stylets of the second (fig. 28 *st*) have distinct though short terminal spines. The tip of the *ovipositor* reaches only to the base of the spine on the ninth abdominal stylet. Its gonapophyses have from fifty-five to sixty segments each (figs. 63–64).

The *ovipositor* in these insects is well worthy of study, though of less value than the male reproductive processes in specific determination. There are two pairs of gonapophyses on the eighth and ninth segments respectively (see figs. 63, 64 *go*); the bases of these are connected with the inner anterior corner of the sub-coxae to which they belong. Each gonapophysis is worked by appropriate muscles—an adductor (fig. 65 *ad*) the insertion of which is carried but a short distance along the appendage; and an extensor (fig. 65 *ext*), some of whose fibres are inserted close to the base, while a few, drawn out to a great length. extend right along the outer margin of the gonapophysis, almost to its tip (fig. 65 *ext'*). The segmentation of these appendages is well marked; the proximal segments (fig. 65 A) bear few, feeble, and short bristles; but beyond the extremity of the ninth abdominal sub-coxae these bristles become, almost suddenly, long, stiff, and prominent (fig. 65 B), this character persisting almost to the extreme tip (fig. 65 C). Each sub-coxa of the ninth segment articulates with a small, sub-triangular, basal sclerite which from its position might be regarded as an episternum (fig. 64 *epst*). From it originates an abductor muscle (fig. 64 *abd*), whose fibres pass, diverging slightly towards the axis of the body, and are inserted into the inner edge of the base of the sub-coxa.

The scaling of *C. brevipalpis*—as of the other species of Corethromachilis—resembles that found generally in the family. Two typical forms of scale from abdominal sub-coxae are figured (fig. 66), one being of a moderately broad, and the other of a narrower and elongate, type. Some of the smaller and more delicate scales are broader than long.

Corethromachilis gibba sp. nov.

(Plate IV, figs. 45–62.)

Paired ocelli (fig. 46, 47 *p.o.*), short and ovoid, situated on either side of a conical prominence in front of the eyes. Jaws transversely extended, and brush of maxillary lacinia complex, as in *C. Gardineri*. Maxillary palp nearly half as long as body. Thorax with the mentanotum produced dorsalwards into a prominent hump; margin of mesonotum broadly convex laterally, and sinuate in front (fig. 45). Legs short; foot-claws short and scopulae dense (fig. 55). Feelers and tail-process half as long again as body. Cerci two-thirds length of body.

Length 10mm. Colour of scaling, dark.

Localities.—Mahé: Mare aux Cochons, 1500 feet, in dead leaves (January, 1909, one female). Silhouette: 1500 feet, in high damp forest, among fallen, rotten palm-leaf bases, and other dead leaves in damp and shady jungle (eight specimens of both sexes, August, 1908, collected by Mr. H. Scott, who states that they jump vigorously).

This insect, with the great hump on its metathorax and the outstanding conical process in front of the head, may be distinguished at a glance from all known Machilidae. So conspicuous are these distinctive features that the establishment of a distinct genus for the species might be thought desirable by some entomologists. But in the structure of its jaws, feet, and abdominal segments and appendages the insect resembles so closely the two Corethromachilis already described, that it seems reasonable to consider it cogeneric with them. It is suggestive that in *C. gibba* the tendency to develop conical out-growths should be displayed both on the head and the metathorax.

In the *feeler* the basal segment is three times as long as broad, and the regions of the flagellum have about 18–20 segments each (fig. 48). The arrangement of the *ocelli* is most remarkable, the median one looking directly downwards and those of the pair being placed close together on either side of the conspicuous prominence in front of the eyes (figs. 46, 47). The eyes are in contact for a comparatively short distance along the median axis of the head. As in *C. Gardineri*, the *mandible* (fig. 49), *tongue* (fig. 50 *hy*), maxillula (fig. 53 *Mxl*), *maxillary galea* (fig. 51 *g*), and *labium* (fig. 52) are exceedingly broad in proportion to their length. The maxillary lacinia has a head with complex brush, resembling that of *C. Gardineri* (figs. 7, 8, 9) so closely that it is needless to figure the details. The *legs* (figs. 54, 55) also are very like those of *C. Gardineri*; the scopula, however, in *C. gibba* is rather smaller, and the claws are a little longer than in the former. The abdomen of *C. gibba* is relatively small as compared with that of the other species, as may be seen by comparing the outlines of the *abdominal segments* (figs. 56–60) with those of the corresponding structures on Plate II. On the second segment (fig. 56) the stylet has a short but distinct spine. The ninth stylet (fig. 60 *st*) has a slender, acute spine almost its own length. The male gonapophyses of *C. gibba* are weakly developed and feebly jointed (figs. 61–62).

It is well known that various interpretations of the genital armature of insects have been given by different students. The term *gonapophyses* emphasizes the correspondence of these structures in the Thysanura with those in the Orthoptera and other insects which have a typically developed male and female armature. Terms such as "telepodite" and "parameron" have been applied by some authors who, like Escherich ('04, pp. 23–6), regard a genital process as comparable to the terminal portion of a thoracic leg. Silvestri ('05, pp. 794–7) has argued convincingly in favour of the opposite view: that the abdominal stylets, rather than the gonapophyses, are to be regarded as appendicular; and he has brought forward some reasons for considering the latter as homologous with the exsertile vesicles on the unmodified abdominal segments. It is at least suggestive that the genital segments of the abdomen never bear exsertile vesicles in the Thysanura.

Family **LEPISMIDAE**.

This family is fairly well represented in the fauna of the Seychelles, as shown by the collection now described, and there can be no doubt that further species await discovery. Students of the Lepismidae owe much to Escherich, whose beautiful monograph ('04) stands as a foundation for modern systematic work. He divides the family into three sub-families:—

A. Inner edge of maxillary lacinia with teeth and bristles. Head never longer than prothorax.
  a. Sub-coxae of genital segments broad and flat, covering bases of gonapophyses. Eyes present. Terminal segment of maxillary palp without sensory papillae. Body always scaled, ... *Lepisminae.*
  b. Sub-coxae of genital segments narrow, not covering bases of gonapophyses. Eyes wanting. Terminal segment of maxillary palp with conspicuous sensory papillae. Body scaled or unscaled, ... *Nicoletiinae.*
B. Inner edge of maxillary lacinia smooth. Head longer than prothorax. Eyes present. Body unscaled, . . . *Maindroniinae.*

The first and second of these sub-families are represented in the Seychelles; the last is known to include only a single species from Arabia. It is noteworthy that all the Seychelles Lepismidae belong to well-known and widespread genera, in contrast to the Machilidae, which are represented in the archipelago by a distinct and peculiar genus.

LEPISMINAE.

The Lepisminae in the collection are distributed among four genera—Lepisma, Isolepisma, Ctenolepisma, and Acrotelsa, which are thus distinguished:—

A. Bristles on head and body-segments simple. Tenth abdominal tergite rounded, truncate, or emarginate.
  a. Bristles on face and terga arranged singly, not in "combs," . . . . *Lepisma.*
  b. Bristles on face and terga arranged in "combs," *Isolepisma.*
B. Bristles feathered.
  c. Tenth abdominal tergite long and acutely pointed, *Acrotelsa.*
  d. Tenth abdominal tergite truncate or emarginate, *Ctenolepisma*

In distinguishing genera, Escherich lays great stress on the nature and arrangement of the bristles, which are unfortunately often knocked off in preserved specimens. The scars marking their points of insertion are, however, usually conspicuous.

Lepisma Linné.

This, the best-known genus of the family, has the little household European "Silver-fish," *Lepisma saccharina* Linn., as its type species. In the collection from the Seychelles the genus is represented by a single myrmecophilous species, which is apparently new. A number of Lepismae from various regions are well known as guests of ants and termites.

Lepisma intermedia sp. nov.

(Plate V, figs. 67–70).

Thorax moderately convex laterally, abdomen evenly narrowed behind; body about three times as long as broad. Feeler half as long as body. Eyes small and round. Abdominal terga with two pairs of dorsal bristles. Tenth abdominal tergum twice as long as ninth, sinuately emarginate behind. median tail process three times, cerci twice as long as tenth tergum (fig. 67). Ninth sub-coxa with inner process only slightly longer than outer (fig. 68).

Length 3–4 mm. Colour of scaling deep brownish violet dorsally, ventral surface, feelers, legs, and appendages generally pale yellow.

Localities.—Mahé: Long Island, from a nest, in decayed log, of *Pheidole punctulata,* an ant known in both Africa and Madagascar (July, 1908, three specimens). Félicité (1908, two specimens).

Unfortunately all the specimens of this little Lepisma are dry and carded, so that it is not possible to make out many structural details. The legs have rather wide shins (fig. 69), and feet with the first and third segments each slightly longer than the second. The shin bears at its outer tip the broad spur commonly found in this family, and some flattened sensory bristles (fig. 70) feebly hooked at the tip. *L. intermedia* comes nearest to *L. Braunsi* Escherich (from South Africa), and *L. indica* Escherich ('04, pp. 50–51), differing by its smaller size, relatively longer median tail-process, and shorter inner ninth sub-coxal processes. It resembles *L. Braunsi* in its emarginate tenth tergum, and *L. indica* in its round eyes.

Isolepisma Escherich.

This genus was established by Escherich ('04, pp. 61–2) for a single wide-ranging tropical species in the description of which no clear indication is given of what are considered generic as contrasted with specific characters. Now that a second species has to be described, it is possible to give a more precise diagnosis of the genus.

Body somewhat narrow; thorax not markedly broader than abdomen, whose tenth tergum is distinctly longer than the ninth. Bristles, simple or bifid at the tip, arranged in tufts on the head, and in "combs" of two or three each on the thoracic and abdominal terga. Two or three pairs of abdominal stylets.

Isolepisma bisetosa sp. nov.

(Plate VI, figs. 71–82.)

Length 7·5 mm. Feelers, median tail-process and cerci shorter than the body (fig. 71). Terga of thoracic segments with a "comb" of two strong bristles at the hinder edge on each side of the middle line, and five or six lateral "combs" (fig. 71). Terga of abdominal segments (II–VIII, inclusive) with two "combs," usually of three, but occasionally of four bristles at the hinder edge on each side, and a comb of two bristles nearer the median line (fig. 71). Process of sub-coxa of ninth abdominal segment in both sexes acuminate, nearly half as long as the stylet (figs. 80, 81). Eighth abdominal segment of male (fig. 80), and seventh and eighth of female (fig. 81), with short stylets. Ovipositor in female (fig. 82) elongate, projecting beyond the tip of the ninth stylet for at least the length of the latter.

The above features serve to distinguish this species from *I. trisetosa*, Esch. ('04, pp. 62–3, Pl. 1, fig. 1), which is rather smaller, has the feelers and caudal process as long as the body, and possesses paired combs on the thoracic segments consisting of three bristles each.

Localities.—Seychelles: Bird Island (1908); Ile aux Récifs (H. P. Thomasset); Long Island (July, 1908). Aldabra (J. C. F. Fryer, 1908–9). Farquhar (30th September, 1908). Providence: Cerf Isl. (J. S. Gardiner, 3rd September, 1905). Amirante, Eagle Island (J. S. Gardiner, May–September, 1905).

This species is apparently abundant, as it is represented by numerous examples from most of the localities. It is very closely allied to *I. trisetosa*, Escherich—the only species of the genus hitherto known—which has apparently a circumtropical range (Brazil, West Africa, Malay Archipelago). It may probably be regarded as having been differentiated from *I. trisetosa* during a long period of isolation.

Sufficient material of this species is available for an examination of the principal structures of the head. The *labrum* (fig. 72 *lbr*) is a short, broad plate, with arched front edge, hinged on to the *face* (fig. 72 *f*), which bears numerous slender bristles, and two series—three on either side—of broad, bifid ones, like those that project in front of the clypeus. The *mandible* differs distinctly in shape from that of Ctenolepisma, figured by Escherich

('04, Pl. II, f. 26). There is a rounded condyle at the base, and the inner hind edge projects around the hollow into which the fibres of the adductor muscles pass (fig. 75). On the outer edge of the mandible are a number of bristles, most of them bifid like those of the head, but a few simple; there are also some bifid bristles along the front inner edge, near the molar area, which is beset with a number of short, strong spines (fig. 76). Beyond these is a blunt projection, and the apex has three prominent but not very sharp teeth; a slight difference between the apices of the right and left mandibles is noticeable. The mandible is worked by at least six distinct muscles. There are two retractors (fig. 75 *re*), inserted into the inner median ridge—one by a single tendon, and the other by a number of slender tendons. A posterior adductor muscle (fig. 75 *ad. p.*), with a tendinous insertion, pulls at the basal region of the mandible, while three median adductors (fig. 75 *ad*), one large and two smaller, with fibres radiating so as to be inserted along the inside of the outer wall, serve to draw the mandible strongly towards its fellow. A closely similar arrangement in *Lepisma saccharina* has been described and figured by Börner ('09, pp. 104–5, fig. 2).

The *tongue* in Isolepisma (fig. 77 *hy*) is small, with the tip hairy, and the peduncles almost parallel. The *maxillulae* (fig. 77 *mxl*) have a roughened apex, with fine, short bristles. No differentiation into galea and lacinia—so apparent in a Machilid maxillula—is here distinguishable. Hansen twenty years ago pointed out that the maxillulae of the Lepismidae are feebly developed as compared with those of the other Thysanura, recalling the condition found in earwigs ('93), but no entomologist has hitherto given attention to these interesting structures in this family.

The *maxilla* (fig. 78) resembles in its main features that of a Lepisma figured by Escherich ('04; Pl. II, fig. 29). The tip of the lacinia has two strong teeth; its inner edge is drawn out into seven delicate teeth, forming a "comb" (fig. 78 *l*), proximal to which are eight prominent bristles. The musculature of the maxilla is like that found in biting insects generally; there is a strong protractor muscle (*pr.*) on the inner edge of the cardo (*c*), while the muscles for working the galea and lacinia (*g. m.* and *l. m.*) originate at the proximal end of the stipes, and have their fibres converging to the insertions at the bases of the lobes.

The *labium* (fig. 79) has a short and broadly arched sub-mentum (*s. m.*), the mentum (*m*), galeae (*g*), and laciniae (*l*) being small, somewhat rugose and spiny; the distal edge of the lacinia is drawn out into a delicate ridge. The four-segmented labial palp has a very broad and blunt terminal segment (fig. 79 *p*).

In both sexes the inner process of the ninth abdominal sub-coxa (figs. 80, 82 *s. c.*, 81) is elongate, acute, and spiny. The *penis* (fig. 80 *pc*), as usual in Lepisma and allied genera, is short; the ovipositor projects far beyond the tip of the ninth abdominal stylets (fig. 82).

Ctenolepisma Escherich.

This genus was founded by Escherich ('04, p. 75) to include Lepismidae characterized by the possession of numerous "combs," of feathered bristles on the thorax and abdomen, four being present on the greater number of the abdominal terga, and by the rounded truncate or emarginate edge of the tenth abdominal tergum. It includes a number of species, whose collective range extends over the tropics and warmer temperate regions of the globe.

Ctenolepisma longicaudata Escherich.

A single female from Félicité, Seychelles, 1908, is evidently referable to this species, which Escherich described ('04, pp. 83–4, fig. 31) from specimens found in houses in South Africa, and to which he referred doubtfully a specimen from Guinea. The presence of the insect on the Seychelles confirms his suggestion that it would be found widely distributed in the Ethiopian Region.

Acrotelsa Escherich.

This genus was established ('04, p. 105) for some Lepismids of relatively large size, distinguished from allied genera by the tenth abdominal tergum being long and pointed. Escherich includes this genus in the sub-family of the Lepismatinae, among the diagnostic features of which (*op. cit.*, p. 36) he mentions the absence of sensory papillae on the terminal segments of both maxillary and labial palps, such sensory papillae being present in the Nicoletiinae. In Isolepisma, and probably in most of the species of Lepisminae, both maxillary and labial palps are without these papillae, and so are the maxillary palps in Acrotelsa. But in the three species of Acrotelsa from the Seychelles collection the labial palps have very conspicuous papillae on the terminal segment, and one of these species is clearly identical with that described by Escherich as *Acrotelsa collaris* (Fab.). Silvestri also has described some species of Lepsima with similar structures ('13, pp. 8–11). It is necessary, therefore, to revise the diagnostic characters of the Lepisminae, and to recognise that in this feature members of the subfamily may approach the Nicoletiinae. The sensory papillae of Acrotelsa are shown in figs. 88, 89 (*A. elongata*, sp. nov.), 98, 99 (*A. Scotti*, sp. nov.), and 101 (*A. collaris*). In the two former species the five papillae are arranged in a single row along the broad end of the terminal segment, while in *A. collaris* they form a proximal row of three and a distal row of two. The cuticle of the papilla has a roughened, wrinkled surface, and is protrusible from a sub-cylindrical projection of the general firm cuticle of the appendage.

In the examination and delineation of the insects of this genus I gratefully acknowledge some valuable help from my colleague, Miss A. J. Reilly, A.R.C.Sc.

The three species of Acrotelsa from the Seychelles may be distinguished thus:—

A. Large, indoor species, over 15 mm. No dorsal combs of bristles on thoracic terga, ... *A. collaris* (Fab.).

B. Small species under 12 mm. A pair of dorsal "combs" on each thoracic tergum.

- *a.* Inner process of ninth abdominal sub-coxa very long, *A. elongata*, sp. nov.
- *b.* Inner process of ninth abdominal sub-coxa of normal length, ... *A. Scotti*, sp. nov.

Acrotelsa collaris (Fab.).

This widely distributed species—the common house-lepismid of the tropics—has already been recorded from the Seychelles (Escherich, '04, p. 108). It is found in both hemispheres, and there can be little doubt that its wide range is largely due to commercial importation. The presence of sensory papillae on the terminal segment of the labial palp has already been mentioned. The insect has been well figured by Oudemans ('90, Pl. VI, fig. 1) and Escherich ('04, Pl. I, fig. 3).

Localities.—Seychelles: Bird Island (1 male, 1 female); Mahé: Port Victoria (3 specimens, dried and carded, 1908-9), Round Island (1 specimen, dried, July, 1908). Coetivy Island (3 specimens, dried and carded, 1905). Aldabra: Picard Island (1 male, 1 female, January, 1909).

Acrotelsa elongata sp. nov.

(Plate VII, figs. 83-90.)

Body-form elongate, narrow. Terminal segment of labial palp (figs. 88, 89) broad and sub-globose with five sensory papillae. Each thoracic tergum with a dorsal and ten lateral "combs" of bristles on each side. Abdominal terga ii–viii with a dorsal and a marginal "comb" on each side. Tenth abdominal tergum acuminate, longer than broad, with four marginal "combs" on each side (fig. 83). Inner processes of ninth abdominal sub-coxa very elongate, their tips almost reaching the extremity of the ovipositor (fig. 90).

The feelers, cerci, and tail-process are unfortunately very imperfect in all the specimens.

Length, 9 mm. Colour, pale with brown scalding; feelers, cerci, and tail-process dark-ringed.

Localities.—Aldabra (1908, coll. J. C. F. Fryer, five females).

This species is very closely allied to the North Australian *A. producta* Escherich ('04, pp. 111, 112) with which it agrees in the immensely elongate ninth sub-coxal processes. *A. producta*, however, has a much narrower terminal segment to the labial palp, and a tenth abdominal tergum that is shorter than broad (Escherich l. c., fig. 45). It is remarkable that this most abnormal form from Aldabra should have its nearest ally on the Australian continent.

Some notes on the jaws of this Acrotelsa may be of interest. The *mandible* (figs. 84, 85) is relatively longer and narrower than in Isolepisma (see fig. 75), and more convex externally than in Ctenolepisma (Escherich, 1904, Plate II, fig. 26). In the group of fine spines at the molar area and the bifid bristles just proximal thereto this mandible agrees with those of Lepisminae generally. The *maxilla* (fig. 86) calls for little remark: the somewhat acuminate tip of the galea projects well beyond the lacinia, which has the inner edge, just proximate to the apical tooth, serrate, with seven delicate lanceolate "comb" teeth, and armed with six prominent bristles (fig. 87). The labium (fig. 88) has the sub-mentum, mentum, and lobes very broad, as well as the terminal segment of the palp, along the edge of which are five oval sensory papillae in a row (fig. 89 *s. p.*).

Acrotelsa Scotti sp. nov.

(Plate VIII, figs. 91–100.)

Body-form elongate, narrow. Terminal segment of labial palp (fig. 98 *p*), broad and sub-globose, arranged with five sensory papillae (fig. 99 *s. p.*). Each thoracic tergum with a dorsal and twelve lateral "combs" of bristles on each side. Abdominal terga ii–viii with a dorsal and a marginal "comb" on each side. Tenth abdominal tergum acuminate, longer than broad, with four marginal "combs" on each side (fig. 91). Inner process of ninth abdominal sub-coxa moderately long, surpassing the tip of the relatively short ovipositor. Gonapophyses slender, cylindrical, feebly segmented (fig. 95).

As with the previous species, the few specimens are all very imperfect as regards feelers, cerci, and tail-process.

Length, 11 mm. Colour, pale with brown scaling.

Localities.—Aldabra: Ile Esprit and Takamaka (November, 1908, four females, J. C. F. Fryer, coll.).

This species is not closely allied to any mentioned in Escherich's "System" (1904), but it comes very near to *A. Voeltzkowi*, subsequently described by him from Madagascar ('10), which differs from *A. Scotti* mainly in having only seven marginal combs on the thoracic terga and only three on each side of the tenth abdominal tergum. The jaws of *A. Scotti* resemble rather closely those of *A. elongata*. Some details for comparison are shown on Plate VIII (figs. 92–3, 96, 98), but they do not call for special description. In the leg (fig. 100) the shin has the usual prominent spur overhanging the base of the proximal segment of the foot, whose third (distal) segment carries between the two claws a slender, almost straight, claw-like empodium.

NICOLETIINAE.

Escherich ('04) included four genera—Atelura, Lepidospora, Nicoletia, and Trinemophora in this sub-family; the two former only are represented in the collection from the Seychelles. Atelura, as understood by Escherich, includes a number of small, scaled, blind insects, resembling Lepismae in general aspect, which live as the guests of ants and termites. Silvestri ('08) has referred some of Escherich's species of Atelura to several distinct genera. Only a few species of Lepidospora are known from various tropical and subtropical countries; these are large, scaled, free-living, bristle-tails. Possibly some examples of the wide-spread scaleless Nicoletiae await discovery in the Seychelles.

Atelura Heyden.

Two dried specimens represent this genus in the collection. They appear identical with or very close to one of Escherich's species of this genus in the wide sense, and as they are unsuitable for microscopic examination, I refrain from any attempt to discuss their relationship among Silvestri's groups.

Atelura nana Escherich.

In the small size (under 2 mm. long), pale colour, and long dense bristly covering (two or three rows on the thoracic segments) the Seychelles specimens agree closely with this species described from South Africa ('04, p. 127, fig. 53), where it was found in nests of *Pheidole punctulata* Mayr.

Locality.—Mahé: Round Island (from nest of Pheidole in broken stone, 19th July, 1908, two specimens).

Lepidospora Escherich.

Escherich founded this genus ('04, pp. 131–2) for the reception of the species *L. Braueri*, described by him from a single male specimen which was brought from the Seychelles to the Hamburg Museum. He referred to this genus another species *L. gracilis* (*l.c.*, p. 178) founded on a single female from Sumatra. Subsequently Silvestri ('08 *a*, pp. 382-4) described *L. Escherichii* from Corfu, *L. ceylonica* ('10, pp. 95-6) from Ceylon, and *L. afra* ('08 *b*, p. 12) and *L. meridionalis* ('13, pp. 12-13) from South Africa. These species all agree in their fairly large size and narrow build, in which they resemble the Nicoletiae, while, unlike the members of that genus, their bodies are scaled. The species of Lepidospora, thus apparently few in number and scattered in their distribution, show a strange divergence in the form of the ovipositor. In *L. Braueri* (whose female is described below) the gonapophyses (Plate X, figs. 117, 118, *go.* 119) are thick, unjointed, and spindle-shaped, like those of Atelura; the same form of ovipositor is found also in *L. Escherichii* Silvestri. On the other hand, in *L. gracilis* Escherich and *L. meridionalis* Silvestri the gonapophyses are elongate, slender, and jointed like those of Nicoletia and of most of the Lepisminae. In *L. ceylonica* Silvestri they are thick and jointed. In this character, therefore, the structure of Lepidospora indicates an interesting transitional condition. A primitive feature of Lepidospora is seen in the presence of eight pairs of abdominal stylets; this large number, characteristic of the Machilidae, is reduced to two or three pairs in most species of the Lepismidae.

Lepidospora Braueri Esch. (1904).

(Plates IX, X, figs. 102-120).

This very curious and interesting species is described and figured in Escherich's Monograph from a single male, collected in the Seychelles, and preserved in the Hamburg Museum. The present collection contains several specimens of both sexes (all from the high level forest regions), so that some account of the structural features of the insect can be given. Attention has been especially paid to the jaws and to the ovipositor in the females.

Localities.—Mahé, in mountain forest: Cascade, 2,000 feet (one male, one female, 3rd December, 1905); Montagne Alphonse, Cascade, 1,800 feet (one female, 4th December, 1905); Mare aux Cochons, 1,500 feet, in dead leaves (one female, January, 1909). Silhouette: highest point, 2,467 feet, in damp earth under dead leaves (one male and four females, several immature, 2nd September, 1908); forest near Mare aux Cochons, over 1,000 feet (9th September, 1908, one immature).

A description of the jaws and ovipositor of a Mediterranean species of Lepidospora (*L. Escherichii* from Corfu) has been given by Silvestri ('08 *a*, pp. 382-4, figs. 18, 19). The *mandibles* of *L. Braueri* (Plate IX, figs. 104-105) resemble those of Silvestri's species rather closely, even to a characteristic difference between the right (fig. 104) and the left jaw (fig. 105) in the form and arrangement of the teeth. The large retractor muscle of the mandible (fig. 104 *re*) is broad and strap-shaped; the fibres of the principal adductor (fig. 104 *ad*) are gathered into a narrow tendon, whence they radiate to the inside of the convex border of the appendage, as in the Lepismatinae. The *maxilla* resembles that of Nicoletia as figured by Escherich ('04, Plate II, fig. 27), but the palp in Lepidospora is relatively much longer. The terminal segment of the palp carries at its tip four knob-like sensory prominences beset with numerous fine hairs (figs. 107, 110, *s. p.*); it also bears, a little behind the tip, a flattened, annular structure (fig. 110 *s.r.*), which may also be regarded as a sense-organ. At the tip of the remarkably slender galea (fig. 107 *ga.*) are two peg-like spines, probably sensory. The lacinia (fig. 107 *l.*, fig. 108) has two teeth at its extremity, and carries on its inner border a most beautiful and elaborate "comb-process" (fig. 108 *c. p.*). This process is beset towards its tip with a double row of strong spines (fig. 109), while at the base there is a series of four or five complex, flattened spinose processes, one branch of each being bifid at the extremity (fig. 108).

The *tongue* (fig. 106 *hy*) is relatively narrower than that of Isolepisma; its tip is emarginate, with a small central prominence. The *maxillulae* (fig. 106 *mxl.*), rather long and narrow in form with rounded extremity, are beset with oblique, parallel rows of fine hairs.

The *labium* (fig. 111) resembles rather closely that of Nicoletia as figured by Escherich ('04, Plate II, fig. 32), the basal plate, galeae, and laciniae being relatively longer and narrower than the corresponding parts in the Lepisminae. In Nicoletia, however, the tip of the lacinia is bifid, while in Lepidospora it is simple. The very broad terminal segment of the palp bears six circular, cushion-shaped sense-organs, each beset with numerous fine hairs (fig. 111).

A thoracic *leg* in Lepidospora consists of coxite, trochanter, thigh, shin, and three-segmented foot (Plate X, fig. 112). The coxite carries several bifid hairs. At the tip of the shin is a strong, claw-like spine overhanging the base of the foot. At the tip of the foot are two strong claws, beset on the basal half with fine short hairs; between the claws projects a slender empodium, bluntly rounded at its extremity (fig. 113). No feature of special interest is presented by the sterna of the abdominal segments from the second to the seventh. Each carries, as usual in the group, a pair of stylets and a pair of protrusible vesicles (fig. 114).

Turning to the terminal *abdominal segments* and their reproductive processes, we find that those of the male have been already well figured by Escherich ('04, text fig. 58, p. 131). I give now, however, a drawing (Plate X, fig. 116) of the ventral view of the tenth abdominal tergum, showing how the stout spines are arranged around the latero-posterior edges of the sclerite, and demonstrating also the conical apodemes (fig. 116 *ap*) and the muscles connected with the cerci and the median appendage.

In the female the tenth tergum is simpler and relatively narrower (fig. 120), without the stout spines that characterize the male, but carrying a pair of long, terminal bristles. The ovipositor of *Lepidospora Braueri* resembles that of *L. Escherichii*, which Silvestri has figured in outline. The large sternum of the eighth segment (Plate X, figs. 117, 118, viii) has a rounded hind margin beset with strong bristles; the sub-coxa is broad (fig. 118 *s.c.* 8), with the stylet inserted, as usual, in a notch near its inner edge. The anterior gonapophysis or process of the ovipositor (figs. 117, 118, *go.* 8) is large, broadly expanded in the middle, and with a blunt tip beset with hairs and a few short spines. The sub-coxa of the ninth segment (figs. 117, 118, *s. c.* 9), on the other hand, is narrow and elongate, constricted centrally; the sub-coxa (*s. c.* 9) and the stylet together are nearly as long as the gonapophysis (*go.* 9), which is narrower than the corresponding process of the eighth segment, shows very imperfect jointing, and carries, near the tip on the inner ventral aspect, a row of thick, curved processes, forming a comb-like structure (fig. 119). In a young individual in which no gonapophyses can yet be distinguished, the stylets of the ninth segment are longer than those of the segments in front, and the sub-coxae are already prominent (Plate X, fig. 115).

The ovipositor of this species of Lepidospora is noteworthy on account of the poorly developed jointing of the gonapophyses. Escherich has given reasons for believing that this jointing, so apparent in the Lepisminae and in Atelura, for example, is of a "false" and "secondary" nature. If this view be accepted, the condition in *Lepidospora Braueri* must be regarded as primitive. It has already been pointed out that in *L. gracilis* Escherich and in *L. meridionalis* Silvestri the gonapophyses of the female are long, with conspicuous jointing.

Family **IAPYGIDAE.**

The members of this family are easily distinguished from other Thysanura by the transformation of the hindmost abdominal appendages into a pair of forceps—a character which gives them the appearance of tiny earwigs. They resemble, however, the Campodeidae and the Collembola in the structure of their jaws, which are for the most part retracted into the head-capsule. The typical genus Iapyx was established long ago by Haliday ('64) for an Italian species *I. solifugus.* During recent years a large number of species have been described from various parts of the world, ranging from the Mediterranean countries and the United States to New Zealand and Chile. It is not surprising, therefore, to find the genus represented in the Seychelles collection.

Iapyx Haliday.

Iapyx silvestris sp. nov.

(Plate XI, figs. 121–134.)

Feelers 25–28 segmented. Legs somewhat slender; foot four-fifths length of shin, bearing two slightly curved claws, with feeble tooth on inner edge, and a short empodium (fig. 121). First abdominal sternum of male (fig. 126) with a small median rounded projection on the hinder edge, and a pair of vesicles, over which are two "comb"-series of small sharp bristles. Sixth abdominal tergum evenly rounded behind; seventh with the hind corners very slightly produced; tenth distinctly longer than broad (fig. 127). Forceps nearly as long as tenth segment; slightly asymmetrical, with the tips of the cerci strongly turned inwards, and the right internal tooth nearer the base than the left (figs. 127, 134).

Length 7 mm. Colour varies from whitish to chestnut in different specimens—all apparently adult.

Localities.—Mahé: Forêt Noire, at and over 1,000 feet elevation (5 specimens, both sexes, 1908). Silhouette (4 males, 1908).

This species is remarkable for the comparatively small number of antennal segments. In Verhoeff's synopsis of the genus ('04) no species with less than thirty segments in the feeler is mentioned. According to Silvestri ('08*a*, p. 389) the true *I. solifugus* Haliday has twenty-eight, while *I. anodus* Silvestri ('05, pp. 788–9) from Chile, has only twenty-seven. The latter, however, may be readily distinguished by the relative thickness of its legs, and the absence of internal teeth on the forceps, from the Seychelles insect. From *I. solifugus*, the species now described differs markedly in the armature of the first abdominal sternum as well as in the comparatively broad and blunt processes at the hind corners of the seventh tergum. *I. silvestris* is remarkable in apparently possessing only one "auditory" bristle beneath each of the three antennal segments (fourth, fifth and sixth), which usually carry three or four such structures (fig. 124).

From comparison of the specimens in this collection it appears that the feelers of Iapyx are capable of a high degree of contraction and extension. All the individuals from Mahé had the feelers presenting the appearance shown in fig. 121, while in two of the Silhouette specimens they were very much shorter and markedly thickened a little beyond the base (fig. 122). Naturally the first conclusion drawn was that the latter must belong to a distinct species, but when a third insect from Silhouette was seen to have one long and slender, and one short and thick feeler, and a fourth to have the basal half of its feeler thick, and the distal half slender (the junction between the two sections is shown in fig. 123), it was clear that these appendages must be capable of great modification in appearance. This was confirmed when one of the short and thick-feelered insects was transferred from alcohol to caustic potash with the result that the distal half of the feeler lengthened out, resuming its previous contracted condition when the specimen was passed on into glycerine. Study of well-cleared specimens show that each segment of the feeler consists of a cup-shaped middle region broadening distally, covered with firm cuticle, while the proximal and terminal regions are covered with thin flexible cuticle, which has a wrinkled surface in partly contracted specimens. What happens on contraction is that these firm, cup-shaped regions are pulled back into each other, the flexible intermediate tracts being invaginated (fig. 123). For this purpose the feeler is provided with two strands of longitudinal muscle. No reference to this interesting change of appearance seems to have been made hitherto, and it will be necessary for systematists to consider it in future when describing the feelers of insects of this family.

The jaws of the South European Iapyx have been well described by Meinert ('65), von Stummer-Traunfels ('91), and Börner ('08), and as those of the Seychelles species resemble these very closely, it is needless to dwell upon them, though considerable difference of opinion has been expressed as to the homology of the structures usually regarded as maxillary. The under surface of the head of *I. silvestris* (fig. 125) shows the features usual in the labium of this family, with the stumpy, bristly, unjointed palps (*p*) that characterize the typical genus Iapyx.

Very little attention seems to have been paid to the genital armature in Iapyx. Grassi ('88, pp. 569, 572, pl. iv, fig. 47, pl. v, fig. 52) described and figured somewhat diagrammatically the external reproductive organs in both sexes, and Verhoeff drew the male ('04, pl. v, fig. 22) and female ('03, pl. xviii, fig. 8*a*) structures of *Heteroiapyx novae-zeelandiae.*

In both sexes there is a small sub-semicircular chitinous plate connected by flexible cuticle with the hind edge of the eighth abdominal sternum, behind which it is usually reflected. When protruded, therefore, it appears between the eighth and ninth sterna. In the male (figs. 132, 133) this plate has a marginal row of long bristles, and its ventral edge is beset thickly with short spines. Ventral to this plate extends a straight, hairy ridge (fig. 132 *r*), from the two ends of which project the short, unjointed, bristly gonapophyses (*go.*). The crescentic opening of the ejaculatory duct is just hidden by the above-mentioned ridge when the organs are seen ventrally. In fig. 132 is shown the shape of the opening, as seen through the thin, translucent cuticle of the genital plate viewed from the dorsal aspect.

The genital plate in the female (fig. 130) has the same form as in the male, but its ventral surface is feebly granulated, bears no spines, and carries only a few long bristles. The vulvar opening is between this plate and a transverse ridge which projects dorsal to it; between the two lobes (fig. 130 *l*) which bound this flap the central spermathecal opening (fig. 130 *spc*) appears, while external to the lobes are the gonapophyses (fig. 130 *go.*), less prominent than those of the male. The lobes and the gonapophyses are evidently the inner and outer "papillae" as figured by Grassi; their arrangement in *Heteroiapyx novae-zeelandiae,* as sketched by Verhoeff ('03, pl. xviii, fig. 8*a*), is very similar. At the extreme tip of the female gonapophysis is a bluntly conical papilla, around the apex of which five or six minute bristles form a ring (fig. 131).

Family **CAMPODEIDAE.**

The interesting little insects comprised in this family agree with the Iapygidae in their retracted jaws, but differ in the nature of the hindmost abdominal appendages, which are elongate tail-feelers or cerci, as in Thysanura generally. Very little is as yet known of tropical Campodeidae; being blind insects living in soil and such concealed surroundings, they are seldom collected, and, being very fragile, imperfect and unrecognizable specimens are commoner than those fit for description. The Campodeidae from the Seychelles are few in number but highly interesting, as the species represented clearly belongs to the little-known genus Lepidocampa (Oudemans, 1890), whose members are distinguished from all other Campodeidae by being partially clothed with scales.

Lepidocampa Oudemans.

This genus was established by Oudemans ('90, pp. 76–7) for an Indo-Malayan species *L. Weberi*, inhabiting Sumatra, Java, and Flores. Silvestri ('99) found what he regarded as this identical species in Argentina, and afterwards ('01, p. 242; '05, p. 777) mentioned its presence in other parts of South America—Brazil, Paraguay, and Ecuador. Oudemans gives the number of antennal segments (over thirty), as he observed it in the Malayan insects, as a generic character, but Silvestri states that in the Argentine specimens the number of segments in the feelers varies from 22 to 32.

Just 22 are present in the few Seychelles specimens that possess a perfect feeler or two, so that, as far as this character is concerned, they might be referred to Oudemans' species, which they evidently resemble closely in size and general appearance. In the minute structure of the jaws, legs, and abdominal appendages, they appear to differ distinctly from the figures which Silvestri ('99, pls. 6, 7) has given of the South American Lepidocampa; and specific identity in wingless insects from such widely separated areas is unlikely. Indeed, Silvestri ('01, p. 242) admits that comparison of types would be necessary to verify the reference of his Lepidocampa to Oudemans' species. For the present, therefore, it seems advisable to describe the Seychelles specimens under a new name.

Lepidocampa fimbriatipes sp. nov.

(Plates XII, XIII, figs. 135–157.)

Feeler with twenty-two segments, four "auditory" bristles on segments 3–6, inclusive, and a rosette-shaped antennal organ at tip of terminal segment (figs. 135–8). Mandible with four prominent apical teeth, and a lacinial "comb" of eleven teeth (figs. 141–2). Legs as in *L. Weberi* Oudemans: the laminate pulvilli bearing on each side a series of stiff, bristly outgrowths (fig. 146). Stylets of first abdominal segment in male (fig. 153) broadened distally with numerous spines, in female bluntly tapering, with a few terminal papillae (fig. 147). Stylets of abdominal segments 2–7 each with two conspicuous stout terminal spines (fig. 148). Telson and anal valves acutely pointed (figs. 149–150). (Cerci wanting in all specimens.)

Length 3·5 mm. Colour, rich brown—the scales showing a golden lustre when dry.

Localities.—Silhouette. Mahé, Forêt Noire, 1000 ft. A few specimens only from each island.

The rarity and interest of this genus make it advisable to enter into some details with regard to the structure of our Seychelles species for comparison with those given by Oudemans and Silvestri for the Malayan and Neotropical forms respectively. The Campodeoid aspect, combined with the restricted clothing of most characteristically shaped scales (fig. 140)—present on thorax and abdomen, but not on head or legs—makes a Lepidocampa easily recognisable. The *feelers* are shown by the Seychelles specimens to be capable of retraction and extension like those of Iapyx mentioned above (pp. 21–2). Silvestri saw and figured ('99, pl. 7, fig. 10) the *antennal organ* at the tip of the feeler's terminal segment; as seen from the side, it appears—as shown in his drawing—as a relatively large papilla surrounded by bristles. In

L. fimbriatipes (fig. 138) it is seen in surface view to consist of four prominences arranged rosette-wise, and surrounded by a cuticular thickening, close to which project a number of stout, thick, elongate spines. Silvestri overlooked the "*auditory*" *bristles* on the antennal segments from the third to the sixth, inclusive (figs. 136, 137). They agree closely with the similar structures found in Campodea; each bristle springs from the centre of a conspicuous cup-shaped depression of the cuticle. There are two of these sensory bristles on the lower, and two on the upper, aspect of each antennal segment bearing them.

The *mandible* (fig. 141) resembles generally that of the Argentine Lepidocampa figured by Silvestri (*l.c.* pl. 6, fig. 4), having an acuminate condyle and four prominent apical teeth, three of which bear minute subsidiary teeth; on the inner face of the third tooth are a series of ridges, forming apparently a grinding area. The lacinia to which Silvestri drew attention is conspicuous, consisting of a delicate "comb" of eleven teeth springing from a wide base attached to a blunt outgrowth of the inner edge of the mandible just beneath the teeth (fig. 142 *l*).

The *maxillulae*, *maxillae*, and *tongue* agree rather closely with the corresponding structures in Silvestri's American Lepidocampa ('99, pl. 6, fig. 6); in our species, however, the lacinial "comb" (fig. 143 *l*) has six processes, each ending in a delicate and slightly inflected lamella. The innermost of these processes has a perfectly smooth inner edge in *L. fimbriatipes*, whereas in Silvestri's figure it is shown with a marginal row of small, sharp teeth. The palp (fig. 143 *p*) is acuminate, with two or three papillae and stiff spines at its tip; it projects obliquely and inwardly towards the mouth from the *galea* (fig. 143 *g*), which is crowned with a group of long bristles, and bears near its anterior terminal edge a blunt, peg-like sensory structure (fig. 144). The *maxillula* (figs. 143, 157 *Mxl*) consists of a sub-triangular lobe with its blunt apex projecting over the tongue (*Hy*) and beset with very fine ridges and hair-like outgrowths. The outer edge of the maxillula is connected with the palp and galea just described, and the arrangement of these parts in Lepidocampa—lying as they do distinctly anterior to the stipes and lacinia—suggests that they belong really not to the maxilla, but to the maxillula, an opinion advocated—after study of the very similar corresponding organs in Campodea and Iapyx—by von Stummer-Traunfels ('91) and Hansen ('93). But the base of the galea is clearly connected with the maxillary stipes, the lacinia in insect maxillae generally lies behind the galea, and Börner ('08), after careful comparison of these structures in Iapyx with those of Machilis on the one hand, and of the Collembola on the other, is convinced that they are rightly referred to the maxilla. In support of this view, it is noteworthy that in the Machilids—probably as regards their jaws the most primitive of all insects—the palp of the maxillula is vestigial (see figs. 5, 38, *Mxl*), and it seems unlikely that in the Iapygidae and Campodeidae the maxillular palp should be well developed and the maxillary utterly vanished.

The *labium* (figs. 145, 152) is, as Silvestri has pointed out ('99, p. 393), closely like that of Campodea, but his figures (*l.c.* pl. 6, figs. 7, 8) are imperfect in detail. The *sub-mentum* (fig. 152 *s.m.*) lies directly in front of the prothoracic presternum (*pst*), and the *mentum* (*m*) is reduced in extent. The ovoid protuberances (*p*), covered with sensory spines, are probably rightly regarded by Silvestri as palps, while the small conical processes (*l*), which Meinert ('65) considered to be palps, are evidently—from their internal position, as Silvestri has seen—laciniae. The broad, bristle-bearing lobes that project behind the mouth (fig. 152 *g*) must thus be recognized as galeae.

The legs in their relative lengths and in the proportions of their segments agree closely with those of *L. Weberi*. The most remarkable feature of these limbs is found in the beautifully fringed processes—apparently pulvilli (fig. 146 *pl*)—projecting on either side from the small claw-like empodium (*emp*) below the strongly curved claws (*cl*). From Oudemans' description and figure ('90, p. 77, pl. vii, fig. 8) it seems that these pulvilli in our Seychelles insect resemble very nearly those of his species. The pulvillus is a delicate, leaf-like plate, both edges of which bear series of stiff, slightly clubbed bristles projecting as a fringe, those of the outer series being longer than those of the inner. Silvestri's drawing of the foot of the South American Lepidocampa ('99, pl. 7, fig. 19) represents the whole surface of the pulvillus as covered by a number of rather feeble hairs, an entirely different arrangement from that found in *L. fimbriatipes*.

The first *abdominal segment*, with its appendages, shows the sexual difference characteristic of Campodea. In the *female* (fig. 135) the hinder edge of the sternum is furnished with a row of simple bristles, while the *stylet* (fig. 147) carries long bristles from its base onwards and a few spinose papillae at the tip. It is apparently relatively longer and less blunt than in Silvestri's species ('99, pl. 7, fig. 12). In the *male* (fig. 153), the *stylet* is relatively short and thick, with a cluster of spinose papillae at the tip, while the edge of the sternum bears several rows of spines, those of the two hindmost on prominent glandular papillae. The *stylets* on the succeeding six abdominal segments (fig. 148) bear each two strong spines at the extremity. Silvestri's description and figure ('99, p. 393, pl. 7, fig. 14) indicate these stylets merely as "setosi" in the species that he discovered in South America.

The *exsertile vesicles* are conspicuous on the abdominal segments from the second to the seventh, inclusive (fig. 135). When thrust out they exhibit a stiff cylindrical base, bearing the somewhat granulated, bladder-like extremity (fig. 154 *e.v.*).

Neither Oudemans nor Silvestri mentions the *reproductive organs* of Lepidocampa; it is gratifying, therefore, to find that the Seychelles specimens afford material for at least a preliminary account of them. As might have been expected, they resemble rather closely those of Campodea, as described and figured by Grassi ('88. pls. iv and v, figs. 46, 50) and Meinert ('65, pl. xiv, fig. 13). In the *male* the hinder edge of the eighth abdominal sternum (fig. 154, viii) projects as a sub-triangular process, bearing series of long and short bristles, and concealing the external reproductive organs. These are exceedingly simple, consisting of two flattened chitinous *genital plates* (fig. 155 *g.p.*) with their free edges sub-semicircular and bearing series of bristles; between these plates the ejaculatory duct opens, so that the whole structure forms a kind of penis, as it is called by Meinert. The very short median *ejaculatory duct* (fig. 155 *d.e.*) is formed by the union of paired *vasa deferentia* (*v.d.*); its outer coat is thrown into a series of corrugations, showing that the organ in the specimen examined is in a retracted condition, the retraction being brought about by the action of muscles running parallel to the general direction of the tube, and originating in the abdominal exoskeleton; when extended the organ would evidently protrude beyond the hinder edge of the eighth sternum.

The *female's* eighth abdominal segment has the hinder edge of the sternum almost straight centrally (figs. 135, 156). Beyond it project a pair of short, blunt, conical processes, with a few bristles (figs. 135, 156 *go*) which may reasonably be regarded as the gonapophyses; the vulvar opening is between these and a semicircular *genital plate* (fig. 156 *g.p.*) corresponding to the dorsal plate similarly situated in the male. Anterior to these structures, and concealed by the eighth sternum, is the slit-like *spermathecal opening* (fig. 156 *spe*).

In both sexes the hinder edge of the tenth abdominal tergum (figs. 149, 151) is adorned with a series of simple, bifid, and feathered bristles; beyond it projects the pointed *telson* (figs. 149, 150 *te*). The tenth sternum also has its hinder edge beset with varied bristles; it is deeply cleft in the middle line (figs. 150, 154), each half partly concealing an acuminate *anal valve* (*vl*) which bears an obliquely arranged series of papillae, whence spring long, flexible bristles. External to these valves may be seen the bases of the *cerci* (fig. 154 *ce*), which are unfortunately wanting in all the specimens examined.

The contents of the rectum are easily visible in some of the specimens, and afford interesting information as to the food of Lepidocampa. They consist either of conidia of Helminthosporium[1] and other fungi, or of fragments of insect cuticle and bristles; probably the latter indicate that Lepidocampa behaves as a scavenger rather than as a beast of prey.

Order COLLEMBOLA.

The describer of Collembola, or "Spring-tails," from the Seychelles has the advantage of a field almost unworked, as one species only of these insects, *Acanthurella Braueri*, Börner ('06), seems as yet to have been recorded from the Archipelago. That insect is represented in the present collection, and so is a species *Axelsonia thalassophila*, Börner ('07), described lately from Madagascar. The remaining sixteen species now recorded appear to be all new to science.

Among the Collembola there is a marked division into two groups, which Börner ('01) is probably justified in regarding as sub-orders. They are thus characterized :—

A. Segmentation of the abdomen well marked, occasionally the fifth and sixth or the fourth, fifth, and sixth segments partially fused. Body elongate in form. Tracheal system wanting (except in the Actaletinae), ... *Arthropleona.*

B. Abdomen sub-globular with the segmentation obliterated. Tracheal system developed, ... *Symphypleona.*

Of these two sub-orders, the latter, which marks a higher degree of specialization than the former, appears to be unrepresented in the fauna of the Seychelles, all the eighteen species here recorded being members of the Arthropleona. The Arthropleona may be most naturally divided into two very distinct families, though Börner in his latest classification ('13*b*) regards these as "sections" containing three families each, an unwarranted systematic elaboration.

A. Prothorax well developed, with definite tergum, bearing bristles. Cuticle usually granulated, ... *Poduridae.*

B. Prothorax much reduced, its tergum undeveloped. Cuticle not granulated, ... *Entomobryidae.*

Only a single Seychelles species belongs to the former of these two families; the remaining seventeen are all Entomobryidae.

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[1] For the determination of this genus I am indebted to my colleague, Professor T. Johnson, D.Sc.

Family **PODURIDAE.**

Spring-tails of this family are numerous in the great northern continental tracts, and not rare even in the Arctic regions. In tropical countries they appear to be relatively scarcer, and this scarcity is especially noticeable in insular faunas. The single Seychelles species belongs to a sub-family Neanurinae,[1] characterized by the slender, elongate mandibles and maxillae (see Plate XIV, fig. 1 *mnd, mx*, fig. 3), the mandibles being without a grinding molar area, and the jaws being often adapted for piercing rather than for biting.

NEANURINAE.

Neanura sexoculata sp. nov.

(Plate XIV, figs. 1–6.)

Three ocelli (fig. 1 *oc*) and a vestigial post-antennal organ (fig. 1 *p.a.*) on each side of the head. Foot with claw untoothed, empodial appendage (fig. 5 *emp*) vestigial. Maxilla (fig. 3) with acute apex and simple delicate process (?palp. fig. 3 *p*). Fifth abdominal segment with intermediate tubercle (fig. 6 *tb*^{1}) distinct from dorso-lateral tubercle (fig. 6 *tb*^{2}); each of these tubercles bearing a sensory bristle dorsally. Abdominal dorso-lateral tubercles rounded.

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[1] Börner ('06, pp. 156–7) proposes to replace the established name (Neanura) of the typical genus of this sub-family by Achorutes, which Templeton gave (Trans. Ent. Soc. Lond., 1836) to a genus comprising two diverse species—(1) *dubius* (belonging to Achorutes as understood by Tullberg, Lubbock, Schött, and the great majority of modern writers) and (2) *muscorum*, belonging to Gervais' Anura, 1841 (modified into Neanura by MacGillivray, 1893). Börner wishes to revive for the former of these two groups Bourlet's generic name Hypogastrura (Mem. Soc. Science Agric., Lille, 1839), which is stated by its author to be founded for *Podura aquatica* Linné, although the description and figure given show—as Börner correctly points out—that Bourlet had in view a species congeneric with Templeton's *Achorutes dubius*. Hence Börner argues that Hypogastrura must stand as the generic name of this group, and *muscorum* must become the type of Achorutes, Templeton. Börner's argument seems reasonable, and he has been followed in this revision of nomenclature by many subsequent writers. Yet his decision prejudges the question, still under consideration by the International Commission on Zoological Nomenclature, whether the type of a genus based on a misidentified species ought to be fixed by what the author states or by what he means. In the "Smithsonian Inst. Publication," No. 2256, 1914, pp. 152 f., this question is argued by a number of zoologists from opposite standpoints, and is finally reserved by the Commission for consideration; and if this decision hold an author to the letter of his statement, Hypogastrura becomes a synonym of Podura. Until, therefore, the principle shall have been settled by authority, I prefer to retain a nomenclature which nobody can misunderstand, for Neanura can mean one genus, and no other. Achorutes, thanks to Börner's "emendation," has become ambiguous, as any name must when it gets transferred from genus to genus in the same family. Börner himself gives a startling exhibition of the inconvenience and confusion resulting from changes of this kind, by using *Achorutes* in one sense in the introduction to his paper (1906), and in the other sense in the systematic portion of the same paper!

Length 2·5 mm. Colour yellow.

Localities.—Mahé: Cascade, 1000 feet (1908, 4 specimens). Silhouette (1908, 2 specimens).

Two recently described Oriental species, *N. pudibunda* Imms ('12, pp. 86-7), and *N. dubiosa* Ritter ('12, p. 397), resemble *N. sexoculata* in colour, in the number of ocelli, and in the structure of the foot-claw. Imms and Ritter, however, give no details as to the maxillae and the abdominal tubercles, on which Börner ('06, pp. 167–9) has laid stress in distinguishing sub-genera in this genus. But in *N. pudibunda* Imms, a specimen of which I have lately had an opportunity of seeing, the intermediate tubercles of the fifth abdominal segment are fused with the dorso-lateral tubercles as in the European *N. muscorum* Templ. The simple maxilla, the distinction of the intermediate from the dorso-lateral tubercles of the abdominal terga, and the presence of sensory bristles on each of these tubercles in *N. sexoculata* combine to place the species in Börner's sub-genus Lobella, founded for the reception of a Japanese insect—*Neanura* (*Lobella*) *Sauteri*. Börner, however, describes the dorso-lateral tubercles of the four anterior abdominal segments as "zapfenartig" in Lobella; in our Seychelles insect they are rounded like the other abdominal tubercles, so that in this character an approach to typical Neanura (*N. muscorum* Templ.) is shown.

The main features of the head and its appendages may be seen by reference to the drawings (figs. 1–3). The cuticle is covered with strong granulations, and bears three prominent sub-hemispherical bristle-bearing tubercles on each side. The ocelli (fig. 1 *oc*) are imperfectly defined: two lie in front closely apposed, and one behind. In front of the two ocelli is a smooth, cuticular area surrounded by strong granulations; this seems to represent a vestigial, post-antennal organ (fig. 1 *p.a.*). The *feelers* are of the short, stumpy build usual in Neanura; at the tip of the terminal segment (fig. 2) may be seen retractile sensory papillae, near which are some sensory bristles and short spines. The *mandible* (fig. 1 *mnd*) is long and slender; its proximal end evenly rounded, its tip blunt and toothless. The *maxilla* (fig. 3) has a simple needle-like apex, near which is attached a delicate, pointed process (*p*), which may represent the palp. The labium (fig. 4) consists of paired elongate plates with somewhat serrate edge, borne on a median sub-triangular sclerite.

The *foot* and its claw are of the type usual in the genus; no tooth can be seen on the claw, but a minute slender vestige of the empodial appendage ("inferior claw" of older authors) may be distinguished (fig. 5 *emp.*). The arrangement of the tubercles of the abdominal segments and their sensory bristles has already been sufficiently described. The spinose bristles, characteristic of Neanura, are in this species numerous and prominent on all parts of the body.

Family **ENTOMOBRYIDAE.**

Except for *Neanura sexoculata*, described above, all the Seychelles Collembola belong to this large family, the relationships of whose numerous genera have formed the subject of much discussion among specialists. General agreement exists as to the recognition of three principal sub-families, one of which—the Tomocerinae—is not represented in the present collections. In his latest classification of the Collembola, Börner ('13*b*) proposes to raise these groups to the rank of families. The most natural definition of these sub-families, as they may more reasonably be regarded, seems to be that adopted by Schäffer ('97), and by Börner in his earlier works (e.g. '03), and their essential superficial characters may be tabulated thus:—

A. Fourth abdominal segment equal, or almost equal, in length to the third. Scales wanting. Feeler with third and fourth segments simple and sub-equal in length. Post-antennal organ usually present. Dentes of spring without spines, . . . *Isotominae.*

B. Fourth abdominal segment shorter than the third. Body scaled. Feeler with third and fourth segments ringed, the former much the longer. Post-antennal organ wanting. Dentes of spring spinose, ... *Tomocerinae.*

C. Fourth abdominal segment usually much longer than the third. Body scaled or unscaled—always scaled if the third and fourth abdominal segments are sub-equal in length. Post-antennal organ wanting, ... *Entomobryinae.*

Börner in his later writings ('06, &c.) transferred from the Isotominae to the Entomobryinae a group including the common European *Isotomurus palustris*, because these insects bear on the second, third, and fourth abdominal segments sensory bristles or "bothriotricha," which are characteristic of the latter, but not of the former, sub-family. Now Isotomourus (of which there is a Seychelles species) resembles typical Isotoma and its allies so closely in all the main points of structure that Börner was obliged to call in a theory of "convergence" to account for the likeness. Unfortunately almost all writers on Collembola during the last ten years hastened to accept Börner's new classification, although his "bothrioticha" (one is figured on Pl. XIV, fig. 18) are far too slender to carry the weight which he assigned to them. Why should their presence or absence be regarded as of such moment, when species with or without a post-antennal organ may be left peacefully side by side in the same sub-family? And now, in his last paper ('13 *b*), Börner announces the discovery, on the trochanters of the hind legs of Entomobryinae, of another type of microscopical sense-organ. Since these are wanting in the Isotomurini, he restores this group, although its members possess "bothriotricha," to its natural position among the Isotominae. I am glad, therefore, that before reading Börner's latest "system" I had decided to be unfashionable, and to retain Isotomurus and its allies among the Isotominae, especially in view of certain admissions previously made by Börner with regard to Axelsonia, an allied genus of very great interest discussed below.

ISOTOMINAE.

Two species from the Seychelles are referable to this sub-family as just defined, both belonging to the disputed group of the Isotomurini; the typical Isotomini are apparently absent from the fauna of the Archipelago. The species represent two distinct genera which may be readily distinguished.

A. Foot-claw with distinct basal filiform processes. Bothriotricha simple, ... *Axelsonia.*
B. Foot-claw without basal processes. Bothriotricha feathered, *Isotomurus.*

Axelsonia Börner.

This genus was diagnosed by Börner ('07, p. 147) for a marine species found in barnacle-shells on the Manavara reef off the coast of Madagascar. He had, in the previous year ('06, p. 159), published the name, referring to the genus in addition to the Malagasy species, *Isotoma nitida* Folsom ('99 *a*, p. 264, figs. 14–18), from Japan. The slender claw-processes (fig. 12 *l.p.*) and the simple bothriotricha on the abdominal segments serve to distinguish most definitely Axelsonia from all known Isotomine or Isotomurine genera.

Axelsonia thalassophila Börner.

(Plate XIV, figs. 7–14.)

This species was founded by Börner (*l.c.*, pp. 147–150, figs. 1–7) for marine spring-tails collected in barnacle-shells on a reef in Antongil Bay (east coast of Madagascar). The Axelsoniae of the Seychelles collection do not appear to differ specifically from Börner's insects; the only noteworthy divergence is in the comparative lengths of the third and fourth abdominal segments, the former being distinctly the longer in the insects now recorded (see fig. 7), whereas in Börner's specimens these segments are described and figured (p. 147, fig. 1) as of almost equal length. The presence of minute secondary segments or "jointlets" between the second and third and third and fourth antennal segments (see fig. 9) is noteworthy. This feature is mentioned by Folsom in his description of *A. nitida*.

Locality.—Aldabra, from algae, Bassin Cabris, Picard Island. (J. C. F. Fryer, coll. 9th April, 1909.)

On account of the exceptional interest of this species, figures are given of the leading structural features of the Aldabra specimens, that it may be seen how closely they agree with Börner's types. The details shown in Folsom's drawings of his Japanese species *nitida* (in which the third abdominal segment is longer than the fourth) agree also very closely with *A. thalassophila*, and it is possible that we have but forms of one widespread species, with a tropical and sub-tropical range analogous to that of not a few northern Collembola with littoral habitat. The Japanese localities mentioned by Folsom (Tokyo and Niyagi) are apparently, however, not maritime. The geographical relations of shore-haunting insects are especially interesting; a discussion on these is given below (p. 49).

In his remarks on Axelsonia, Börner (*l.c.* p. 150) expressed his opinion that the simple form of the bothriotricha in the genus gives it a position intermediate between the characteristic Isotomini and the Isotomurini. He adds: "Ob sie ein Glied der Isotomini C.B. oder der Isotomurini C.B. ist, lässt sich schwer entscheiden und bleibt möglicherweise stets dem subjektiven Ermessen [!] der Forscher überlassen." After this admission it is somewhat surprising that he continued to argue for the decisive evidence of the bothriotricha as a character for placing the Isotomurini along with the Entomobryinae. Further on he pointed out that from the presence of bothriotricha in certain Poduridae and Sminthuridae, "ist ihre Entstehung zur Zeit der hypothetischen Protocollembola höchst wahrscheinlich." Surely if this be so, and the presence or absence of these bristles is useless as a family character, it should not have been allowed to override the many important and conspicuous features of structure which led systematists, until a few years ago, to include Isotomurus and Axelsonia in the comprehensive genus Isotoma. While objecting to Börner's classification as unwarranted and highly inconvenient, I felt in full agreement with him in regarding Axelsonia as "tief an der Wurzel des ganzen Entomobryenstammes"—an additional argument indeed for considering it to be nearly related to typical Isotoma. And now the discovery that these spring-tails have no "trochanteral organs" leads Börner, as stated above, to replace the insects where this obvious relationship is emphasized.

Isotomursus Börner.

This genus was founded by Börner ('03, p. 171) for the common European *Isotoma palustris* (Müller), and no other species seems as yet to have been included in it. Members of the genus resemble the typical Isotomini in all important points of external structure, but are distinguished by the presence of the six pairs of bothriotricha already mentioned on the abdominal segments. If we are justified in regarding the possession of these as an archaic character, it is of especial interest to find that Isotomurus is represented in the fauna of the Seychelles.

Isotomurus obscurus sp. nov.

(Plate XIV, figs. 15–19.)

Feelers half as long again as the head (fig. 15); relative length of segments as 3 : 8 : 10 : 11. Ocelli eight on each side, the inner posterior one markedly smaller than the rest; post-antennal organ broadly ovate, only slightly longer than the diameter of an anterior ocellus (fig. 16). Foot with simple, untoothed claw and lamellate acuminate empodial appendage; no tenent hair (fig. 17). Length of third and fourth abdominal segments equal; fifth and sixth abdominal segments distinct, and bearing a few long bristles. Spring somewhat short and stout; dens half as long again as manubrium, tapering rapidly to tip; mucro (fig. 19) with prominent apical and dorsal teeth, and a minute accessory dorsal tooth.

Length 1·75 mm. Colour deep violet-blue, except for the sutures of the body-segments and the dens and mucro, which are white.

Localities.—Silhouette, 1908 (6 specimens). Mahé: Forêt Noire, 1000 ft., 1908 (2 specimens).

This species is closely allied to the European *I. palustris* (Müller), but the latter has a tooth on the empodial appendage of the foot, and a small ventral tooth on the mucro of the spring. Its post-antennal organ also differs from that of the Seychelles species, being narrowly elliptical. *I. palustris* has been recorded from Java by Börner ('06, p. 173) and from Calcutta by Imms ('12, p. 93).

ENTOMOBRYINAE.

From the number of species included in this sub-family, it may be regarded as the dominant group among the Seychelles Collembola. Börner and other systematists recognize several tribes which may be regarded as natural assemblages of genera, and are at least convenient for purposes of classification. The tribes and genera comprised in the Seychelles fauna may be distinguished thus:—

A. Sixth abdominal tergum elongate and cereiform, feelers with six segments, the two distal ringed, ... *Heteromuricini.*
including one genus, *Heteromuricus.*

B. Sixth abdominal segment normal, not elongate. Feelers with the four segments all unringed.

i. Dentes of spring flexible, with dorsal edge corrugated, mucro relatively short and slender, with dorsal and terminal teeth and a dorsal spine, . . *Entomobryini.*

m. Body unscaled, ... *Entomobrya.*

n. Body scaled. Mesonotum prominent.

o. Dentes of spring without spines, *Lepidocyrtus.*

p. Dentes of spring with spines, . *Acanthurella.*

ii. Dentes of spring rigid, without corrugations along dorsal edge.

q. Mucro of spring relatively short and broad, ... *Paronellini.*

s. Body scaled, feelers shorter than body, dentes with spines, ... *Microparonella.*

t. Body unscaled, feelers longer than body, dentes unspined, *Cremastocephalus.*

r. Mucro of spring elongate—usually a third or a quarter as long as dens, which carries series of large ribbed scales, ... *Cyphoderini.*
genus, *Cyphoderus.*

HETEROMURICINI.

Heteromuricus Imms.

This remarkable genus was established by Imms ('12, p. 92) for a species *H. cerciter*, found under dead leaves at Calcutta. The name was given on account of the conspicuous tail-process at the hinder end of the abdomen; this, however, appears not to be a "median cercus," as Imms suggested, but the elongate tergum of the sixth abdominal segment. Imms has referred this insect to a new sub-family, the Heteromuricinae, intermediate between the Tomocerinae (seemingly unrepresented in the Seychelles fauna) and the Entomobryinae. He suggests, however, its probable affinity with Heteromurus (Wankel), which is regarded by most recent students as a member of the

Orchesellini. The five- or six-segmented feelers of Heteromuricus show a correspondence with Orchesella, but this is a character that cannot be regarded as of great importance, and the mucro of the spring (fig. 24), with its two teeth and a slender inclined spine, is that of a typical Entomobryine. The jaws, however (see below and next page), are in many respects like those of Orchesella. Until further allied genera shall have been discovered it is, perhaps, best to retain Heteromuricus as the unique representative of a distinct tribe. The insects have a close superficial likeness to species of Tomocerus, on account of the ringed feelers. From these, however, the form of the foot and mucro, and the absence of spines on the dentes, distinguish them at once. Moreover, in Tomocerus the third abdominal segment is longer than the fourth, whereas in Heteromuricus the fourth is clearly longer than the third.

In the Seychelles collection a new species of this genus is represented by numerous examples, which differ in many respects from *H. cerifer* Imms.

Heteromuricus longicornis sp. nov.

(Plates XV, figs. 20–24; XVIII, figs. 74–77.)

Feelers (fig. 20) nearly as long as the body, six-segmented; the proportional lengths of the segments as 1 : 8 : 3 : 9 : 32 : 14, the fifth and sixth segments (except for the proximal end of the former) ringed and surrounded with whorls of short, stout bristle (fig. 22). Eight ocelli on each side of the head, the two posteriors of the inner row very small (fig. 21). Legs with scales and feathered hairs; a single filiform bristle near the tip; claws with minute internal teeth near the base, empodial appendage slender, lanceolate, untoothed (fig. 23). Spring half as long as the body; dens 1¼ times length of manubrium (fig. 20), bearing long feathered hairs; mucro with evenly curved terminal and dorsal teeth, and a fine dorsal spine (fig. 24).

Length 3·5 mm. Colour of scaling dark slaty-grey.

Localities.—Silhouette (1908, 4 specimens). Mahé: Forêt Noire, 1000 ft. (September, October, 1908, many specimens).

This species is very easily distinguished from *H. cerifer* Imms, which has the feelers only about half as long as the body, the eight ocelli all about the same size, and the foot-claws with distal teeth. *H. longicornis* also is apparently half as large again as *H. cerifer*.

Opportunity has been taken from the number of examples of this insect in the collection to make a study of the jaws, as the details of structure known about the genus are scanty. There is nothing remarkable about the *mandible* (Plate XVIII, figs. 74–75), except that the right one has, just proximal to the apical tooth, four small teeth (fig. 74*a*), while the left (fig. 75*a*) has two large teeth, with a couple of small rounded tubercles between them. The maxillulae and tongue (fig. 76) are like those of Orchesella as described and figured by Folsom ('99*b*). The *maxillula* (fig. 76, *Mxl*) has its distal free end angular, with two sub-acute prominences; along the proximal region of its inner edge is the usual row of denticles—the distal few being blunt, the rest relatively long and sharp. The *tongue* (fig. 76 *hy*) is—like that of Orchesella (Folsom, '99*b*, pl. 3, fig. 23)—broad distally, with rounded edges and dorsal depressions bounded by toothed ridges; the supporting foot of the tongue (fig. 76 *pd*) is strikingly like that of Orchesella. So are the cardo and stipes of the *maxilla* (fig. 76 *c. st.*), the sub-cylindrical galea (fig. 76 *g*)—according to the highly probable and ingenious interpretation of Börner ('08)—and the vestigial palp (fig. 76 *p*), with its long, acuminate bristle, being of the usual Collembolan type. The head of the maxillary lacinia (fig. 77) has three strong external teeth—regarded by Folsom and most students as representing the galea—four lamellae (fig. 77 *lm*), composed of closely approximated bristles, and a conspicuous "brush" (*br*), consisting of an axis, with lateral filaments resembling an ostrich-plume in appearance. This structure certainly corresponds with the brush of the maxillary lacinia in Corethromachilis, described above (pp. 4, 6, Pl. I, figs. 7–8), and in the "Mittelanhang" figured by Börner ('08, Pl. VII, fig. 12) as present in the lacinial head of Tetradontophora, which it resembles rather closely.

Food material is visible in the intestines of several examples of this species. It consists entirely of fungus hyphae, and conidia, the latter more fragmental than in the rectum of Lepidocampa (see above, p. 28), but apparently also referable to Helminthosporium.

ENTOMOBRYINI.

Entomobrya Rondani.

Degeeria Nicolet, Lubbock, etc.

This widespread genus of spring-tails, characterized by the absence of scales, the great length of the fourth abdominal segment, and the foot with a conspicuous tenent hair, is represented in the Seychelles collection by a single species, which appears to be undescribed.

Entomobrya seychellarum sp. nov.

(Plate XV, figs. 25–27.)

Feelers nearly twice as long as head, proportion of their segments as 3 : 6 : 5 : 8. Fourth abdominal segment three and a half times as long as third. Foot-claw with three teeth (fig. 26). Mucro of spring with the usual terminal and dorsal curved teeth, the dorsal spine slightly bent (fig. 27).

Colour cream-yellow with violet markings, comprising a streak along each side of the head, a lateral stripe along all the body-segments, paired ⎵-shaped markings on the hinder edge of the metatergum, a strong transverse band on the hinder edge of the third abdominal segment, two pairs of longitudinal streaks running forward from the hinder edge of the fourth abdominal segment, and nearly the whole of the fifth and sixth abdominal segments.

Length 1·3 mm.

Localities.—Mahé: Forêt Noire, 1000 ft. (October, 1908); Cascade, 1000 ft. (1905); Mare aux Cochons, 1000–2000 ft. (January, 1909). Silhouette (1908).

It seems hard to find clear structural characters for defining the species of Entomobrya. In the longitudinal violet bands on the fourth abdominal segment, *E. seychellarum* recalls the European *E. nivalis* DG., but the definite transverse band on the third segment serves to differentiate the present insect.

Lepidocyrtus Bourlet.

This widely spread genus, whose members are scaled, and have the head overhung more or less by the mesothorax, appears to be especially well represented in tropical countries. The Seychelles collection contains no less than seven species—nearly half the total number of Entomobryinae, so that the dominance of the genus is strikingly exemplified. The Seychelles Lepidocryti may be distinguished thus:—

A. Mucro slender, with the terminal tooth strongly procurved dorsalwards.
  i. Feelers not more than twice as long as the head.
    m. Colour uniformly dark except spring and segmental sutures. Mesonotum rather prominent, *L. silvestris.*
    n. Colour pale, with dark lateral streaks, thighs and antennal segments with terminal dark rings. Mesonotum very prominent, . . *L. annulicornis.*
    o. Colour pale, except for darkening of third and fourth antennal segments. Mesonotum less prominent, ... *L. obscuricornis.*
    p. Colour pale, except for lateral patches on fourth abdominal sterna and at tip of hind thighs. Mesonotum rather prominent, . *L. stramineus.*
  ii. Feelers much more than twice as long as head. Mesonotum very prominent.
    q. Feelers about three times as long as head, *L. Fryeri.*
    r. Feelers nearly three-quarters as long as body, *L. imperialis.*

B. Mucro stout, with the terminal tooth relatively small and not directed dorsalwards, ... *L. Gardineri.*

All these species have eight ocelli on each side of the head, arranged in the manner characteristic for Lepidocyrtus (Pl. XVI, fig. 44). The empodial appendage of the front foot (fig. 48) is in all cases less elongate than that of the intermediate and hind pairs (fig. 49).

Lepidocyrtus silvestris sp. nov.

(Plate XV, figs. 28–30.)

Mesonotum moderately prominent, twice as long as metanotum; fourth abdominal segment five times as long as third. Feelers rather less than twice as long as the head; proportion of their segments as 5:7:7:4 (fig. 28). Foot-claw with a single minute tooth, empodial appendage narrowly lanceolate, tenent hair feebly clubbed at the tip (fig. 29). Spring half as long as body; manubrium stout, equal in length to dens and mucro together; mucro (fig. 30) narrow, with slender teeth, the dorsal spine long and acute.

Length 1·1 mm. Colour deep violet: only the intersegmental sutures, the spring and the tips of the feet pale.

Locality.—Mahé: Forêt Noire, 1000 ft. (October, 1908).

Of all described Lepidocyrti known to me, this species comes nearest to *L. caeruleus* Ritter ('12, pp. 389–390), from Ceylon, in which the feelers are proportionately shorter, and the foot-claw has a distal tooth on the inner edge.

Lepidocyrtus obscuricornis sp. nov.

(Plate XV, figs. 31–33.)

Mesonotum but slightly prominent, less than half as long again as metanotum; fourth abdominal segment five times as long as third. Feelers nearly twice as long as head, proportion of their segments as 5:9:9:11 (fig. 31). Foot-claw with two rather strong internal teeth (fig. 32). Spring nearly half as long as body, manubrium stout, as long as dens and mucro (fig. 31); mucro (fig. 33) with very prominent teeth, the dorsal spine slender and slightly curved.

Length, 2 mm. Colour, pale yellow, except for lateral violet specks on fourth abdominal sterna and a violet suffusion on the feelers from the tip of the second segment to that of the fourth.

Locality.—Mahé: Cascade, 1000 ft. (1908, many specimens).

In its type of colouration, structure of mucro, and the hairy feelers, this species resembles *L. scaber* Ritter ('12, pp. 390–1), from Ceylon; the latter, however, has the empodial appendage broadened at the tip.

Lepidocyrtus annulicornis sp. nov.

(Plate XV, figs. 34-36.)

Mesonotum very prominent, two and a half times as long as metanotum; fourth abdominal segment four and a half times as long as third. Feelers half as long again as the head, proportion of their segments as 3 : 5 : 8 : 9 (fig. 34). Foot-claw with vestiges of teeth, empodial appendage very slender (fig. 35). Spring, three-sevenths length of body, manubrium equal in length to dens (fig. 34); mucro narrow and elongate (fig. 36).

Length 1·75 mm. Colour yellow, with violet tips to all the antennal segments and the thighs, and lateral violet streaks on the body segments, those on the fourth abdominal long and furcate (fig. 34).

Localities.—Mahé: Cascade, 1000 ft. (1908, 2 specimens); Forêt Noire, 1000 ft. (October, 1908, 2 specimens).

This species is very readily distinguished from other members of the genus on account of its darkly annulated feelers and the dark-blue body-markings, which give it the aspect of an Entomobrya.

Lepidocyrtus stramineus sp. nov.

(Plate XV, figs. 37–39.)

Mesonotum moderately prominent (fig. 37), two and a-half times length of metanotum. Fourth abdominal segment three and a-half times as long as third. Feelers one and three-quarters times as long as head, proportion of their segments as 5 : 9 : 10 : 11. Foot-claw with minute internal teeth (fig. 38). Spring more than half as long as body, dens slightly longer than manubrium; mucro relatively short, with teeth very strongly procurved (fig. 39).

Length 2 mm. Colour pale yellow, except for violet patches at end of fourth abdominal sterna and at tip of hind thighs.

Localities.—Mahé: Forêt Noire, 1000 ft. (3 specimens, October, 1908).

This species is somewhat near *L. dahlii*, Schäffer ('98, pp. 419–420), from Ralum in the Bismarck Archipelago; the latter species has a less acuminate empodial appendage, and a differently arranged pattern of dark-blue markings on its prevailing yellow ground-hue.

Lepidocyrtus Fryeri sp. nov.

(Plate XVI, figs. 40–42.)

Mesonotum very prominent, three times as long as metanotum (fig. 40). Fourth abdominal segment five times as long as third. Feeler nearly three times as long as head, proportion of its segments as 5 : 12 : 17 : 18 (fig. 40).

Foot-claw relatively short, with proximal and distal internal teeth (fig. 41). Spring half as long as body, dens slightly longer than manubrium; mucro narrow, with teeth somewhat short; dorsal spine straight (fig. 42).

Length 1·75 mm. Colour pale yellow, with tips of second and third, and most of the fourth antennal segments, a few lateral spots on the body-segments, and broad bands on the hind thighs deep violet.

Localities.—Mahé: Mare aux Cochons, 1000–2000 ft. (1 specimen, Jan. 1909).

Lepidocyrtus imperialis sp. nov.

(Plate XVI, figs. 43–46.)

Mesonotum excessively prominent, three times as long as metanotum. Fourth abdominal segment eight times as long as third. Feeler three-quarters as long as body, proportional length of its segments as 13 : 17 : 26 : 28 (fig. 43). Foot-claw elongate and straight, with small proximal and distal teeth; empodial appendage narrowly lanceolate (fig. 45). Spring two-thirds as long as body, the manubrium rather longer than the dens (fig. 43), mucro strong with the dorsal tooth broad and the terminal somewhat flattened (fig. 46).

Length 2·5 mm. Colour pale yellow, with irregular lateral violet streaks on the thoracic and fourth abdominal segments; the tips of the second and third, and almost the whole of the fourth antennal segments violet, also the hind thighs (fig. 43).

Localities.—Mahé: Forêt Noire, 1000 ft. (2 specimens, 1908); Cascade, 1000 ft. (2 specimens, 1908). Silhouette (4 specimens, 1908). Félicité (6 specimens with feelers rather shorter than those from other islands, February, 1909).

This and the preceding species resemble the West African (Cameroon) spring-tail, *L. maximus*, Schött ('93, pp. 11–13, pl. iii), in the relatively long feelers, the very prominent mesonotum, and the type of coloration. *L. maximus* has the mucro like that of *L. Fryeri*, and the foot-claw and appendage like those of *L. imperialis*; it is considerably larger than any examples of the genus from the Seychelles. *L. robustus* Imms ('12, p. 94) from Travancore South India, and *L. pictus* Schäffer ('98, pp. 4, 6 417) from the Bismarck Archipelago, are also allied to this group.

Lepidocyrtus Gardineri sp. nov.

(Plate XVI, figs. 47–50.)

Mesonotum not very prominent, nearly three times as long as metanotum. Fourth abdominal segment seven times as long as third. Feeler nearly three times as long as head, proportion of its segments as 4 : 9 : 10 : 12 (fig. 47). Foot-claw very long, with conspicuous proximal and distal internal teeth, the empodial appendage very long, narrowly lanceolate (figs. 48–49). Spring three-fifths as long as the body, the manubrium as long as the somewhat robust dens (fig. 47). Mucro (fig. 50) stout, with the terminal tooth small, not procurved dorsalwards and the dorsal tooth close to the terminal.

Length 2·5 mm. Colour pale yellow, with the greater part of the second, and the whole of the third and fourth antennal segments, the tip of the hind thigh, the lateral borders of the meso- and metanotum, lateral patches on the fourth abdominal tergum and sterna, and the tip of the sixth abdominal segment deep violet.

Localities.—Mahé: Cascade, 1000 ft. (many specimens, 1908); Forêt Noire, 1000 ft. (many specimens, October, 1908).

This is a very interesting species, showing the long feelers, legs, and spring, and the type of coloration found in the two preceding species and their African and Oriental relations, while the relatively short and blunt mucro recalls that of the common European *L. lanuginosus*, Tullberg.

Acanthurella Börner.

Acanthurella was established by Börner ('06, p. 176) as a sub-genus of Lepidocyrtus for the species from the Seychelles here recorded and another species from Java. The presence of strong spines on the dentes of the spring, the modification of the mucro, and a characteristic facies differing from that of typical Lepidocyrtus, may warrant the recognition of Acanthurella as of generic rank.

Acanthurella Braueri Börner.

Apparently this is the only species of Collembola hitherto recorded from the Seychelles. Börner ('06, p. 176) describes its structural features, but gives no figures, nor any precise locality. From the number of specimens from all the stations mentioned in the present collection, it appears to be common in the islands of Mahé and Silhouette.

Localities.—Mahé: Forêt Noire, 1000 ft. (1908); Cascade, 1000 ft. (Oct., 1908); Mare aux Cochons, 1000–2000 ft. (January, 1909). Silhouette (1908). Numerous specimens from all localities.

There is little to be added to Börner's description of this spring-tail. The feeler is less than twice as long as the head, the proportional length of the segments being as 5 : 11 : 11 : 12. The mesonotum is twice as long as the metanotum, the fourth abdominal segment five times as long as the third. The two posterior inner ocelli are much smaller than the other six (fig. 52). The mucro of the spring is very characteristic in form, having a small, almost straight, terminal tooth, and a broad and very prominent dorsal tooth; the spine is long and distinctly curved (fig. 54).

PARONELLINI.

Microparonella gen. nov.

Body scaled. Feelers relatively short, four-segmented with the segments not markedly disproportionate. Legs spinose; foot-claw normal, empodium narrow, tenent hair feebly clubbed. Ventral tube elongate, with large protrusible bilobed sac. Fourth abdominal segment from three to four times as long as third. Spring elongate, with slender, rigid (Paronelline) dentes; dens with a row of strong spines, but without terminal scale-appendage; mucro of the broad (Paronelline) type, with four or five blunt teeth.

Type, *Microparonella caerulea* (sp. nov.) Seychelles.

This genus is of considerable interest, as it combines the distinctive Paronelline characters of the spring with the general aspect of an Entomobryine insect. In the inconspicuous feelers and the relatively short fourth abdominal segment, it seems much more primitive than most members of the Paronellini, and illustrates an anneetant type of structure that might, perhaps, be expected in some members of the fauna of such islands as the Seychelles. Microparonella—as its name implies—differs from most Paronelline genera in the small size of its species. On the whole, it comes nearest to Dicranocentroides, Imms ('12, p. 102), founded on a North Indian species from the Himalayan foot-hills, with which it agrees in the spinose dentes, but from which it may be readily separated by the much shorter feelers and fourth abdominal segment, and by the smaller size of the insects

The two species referred to Microparonella may be distinguished thus:—

A. Colour blue, three ocelli on each side, foot-claw with no distal
tooth, mucro broader, ... *M. caerulea.*

B. Colour yellow, eight ocelli on each side, foot-claw with strong
distal tooth, mucro narrow, ... *M. flava.*

Microparonella caerulea sp. nov.

(Plate XVII, figs. 55–58.)

Feeler twice as long as the head, proportional length of its segments as 5 : 9 : 9 : 12 (fig. 55), Ocelli three only on each side (fig. 56). Fourth abdominal segment three and a-half times as long as third. Foot with slender sensory bristle, no tenent hair; claw (fig. 57) with strong proximal teeth, but without distal tooth. Spring four-fifths as long as body, the dens slightly longer than the manubrium; mucro (fig. 58) twice as long as broad, five prominent teeth, a ventral, two terminals, a dorsal, and a lateral.

Length 1 mm. Colour violet-blue; only the head, the spring, and the segmental junctions yellow.

Localities.—Mahé: Forêt Noire, 2000 ft. (four specimens, October, 1908).

Microparonella flava sp. nov.

(Plate XVII, figs. 59-62.)

Feeler twice as long as head, proportional length of its segments as 5 : 8 : 6 : 12 (fig. 59). Eight ocelli on each side. Fourth abdominal segment three times as long as third. Foot with slender tenent hair; claw with very prominent proximal and distal teeth (fig. 60). Spring four-fifths as long as body, dens rather shorter than manubrium; mucro (fig. 62) relatively narrow, with five teeth—a terminal, three dorsal, and a lateral.

Length 1 mm. Colour yellow, except for the feeler and a few mottlings on the head and abdomen, blue.

Localities.—Mahé: Forêt Noire, 1000 ft. (one specimen, October, 1908).

This species is evidently nearly related to *M. caerulea*, but the structural differences are quite definite, as well as the colour-distinction. The long, cylindrical ventral tube is characteristic in this genus as in Dicranocentroides Imms; it is conspicuous in both the Seychelles species, and the large bilobed sac is protruded in some of the specimens preserved (figs. 55-61).

Cremastocephalus Schött (1897).

Pterikrypta, Ritter (1912).

First described by Schött for a Mexican species ('97, p. 175), this genus is now known to be well represented in the Eastern tropics. It is remarkable among the Paronellini for the absence of scales on the body, the very long feelers, the broadly laminate empodial appendages of the feet, and the presence of a scale-like organ (figs. 66-70 *a*) on the dens, close to the base of the mucro. All these characters are distinctive of Ritter's genus Pterikrypta ('12, p. 385), he having apparently overlooked Schött's paper.

The two Seychelles species may be distinguished thus:—

A. Mucro of spring thrice as long as broad, colour yellow with broad violet bands and streaks, ... *C. Scotti.*

B. Mucro of spring less than twice as long as broad; colour yellow with narrow lateral violet streaks, . . . *C. pallidus.*

Cremastocephalus Scotti sp. nov.

(Plate XVII, figs. 63-66.)

Feelers rather longer than whole body (including head and spring), proportional length of antennal segments as 4 : 9 : 7 : 5 (fig. 63). Eight ocelli on each side, the two hind inner ones very small (fig. 64). Fourth abdominal segment four times as long as the third. Foot (fig. 65) with the claw strongly curved, with distinct inner basal teeth and a feeble distal tooth; empodial appendage short and broad, the two supporting lamellae of almost equal length; tenent hair very long and stout. Spring three-quarters as long as body; dens rather longer than manubrium (fig. 63); mucro relatively narrow, thrice as long as broad (fig. 66), with three terminal teeth, the median very blunt.

Length 2 mm. Colour pale yellow, with conspicuous violet markings, including a ring at each end of the first antennal segment, a broad ring at the tip of the second, the distal three-fourths of the third, and the whole of the fourth; broad transverse bands on the mesothorax and the second and third abdominal segments; broad paired, lateral bands on the fourth abdominal segment, and the whole of the last two segments (fig. 63).

Localities.—Mahé: Forêt Noire, 1000 ft. (six specimens, October, 1908); Cascade, 1000 ft. (six specimens, 1908).

This species is nearly related to *C. indicus*, Imms. ('12, pp. 104–5 figs. 58, 59), from Calcutta, but it may be readily distinguished from that, not only by the coloration, but by the much more prominent teeth at the end of the mucro. In *C. celebensis* Schäffer ('98, pp. 407–8) the mucro is narrow, as in *C. Scotti*, but its teeth are blunt and rounded. As might be expected from the excessive length of the feelers in these insects, very few specimens are perfect. Interesting cases of regeneration, with a reduced number of antennal segments, may often be observed—for example, the two-segmented right feeler shown in fig. 63.

Cremastocephalus pallidus sp. nov.

(Plates XVII, figs. 67–70, and XVIII, figs. 78–81.)

Feelers (imperfect in all specimens) longer than the whole body, first segment may be twice as long as head (fig. 67). Eight ocelli on each side, the two hind inner ones much smaller than the others (fig. 68). Fourth abdominal segment six times as long as third. Foot (fig 69) with claw slightly curved, inner basal teeth distinct, distal teeth obsolete; empodial appendage with outer supporting lamella longer than inner. Spring three-quarters as long as body; dens rather longer than manubrium; mucro (fig. 70) hardly twice as long as broad, with three terminal teeth, the median one truncated.

Length 2·5 mm. Colour pale yellow, except for violet streaks on the head and along the edges of the body-segments, and violet patches on the thigh-tips and shins (fig. 67).

Localities.—Mahé: Forêt Noire, 1000 feet (many specimens, October, 1908); Cascade, 1000 feet (many specimens, 1908).

This species is distinctly larger than the preceding, and easily recognizable by structural characters as well as by its coloration. Its mucro is rather like that of *C. montanus* Imms ('12, pp. 105–6, fig. 60), from the eastern Himalaya, but in that species the scale-like appendage is quadrate, whereas in both the Seychelles insects that structure is rounded. This latter character is shown also in the American species *C. trilobatus*, Schött ('97, pp. 175–8), which has, however—like *C. affinis* Folsom ('99 *a*, pp. 265–6) from Japan—the hairs on the dentes feathered, a condition not found in either of the Seychelles insects, nor apparently in Imms' Indian species. From Ritter's somewhat rough figures ('12, p. 386), his *Pterikrypta sulcata* from Ceylon must be very closely allied to *C. pallidus*, the form of the mucro agreeing almost precisely, and the foot-claws apparently differing but slightly, "eine flache Erhebung," according to Ritter's description and figure occupying the place of the sharp basal tooth; the coloration also, as described by Ritter, is strikingly like that of *C. pallidus*, so that a comparison of types might establish specific identity between the two forms.

As no study of the jaws of any member of the Paronellini appears ever to have been made, some account of these structures in *Cremastocephalus* may be given with advantage (Plate XVIII, figs. 78–81). There is a remarkable general uniformity in these organs throughout most groups of Collembola. In Cremastocephalus the *mandible* (fig. 78) is of the usual form, and calls for no special remark. The *maxillula* (fig. 79 *Mxl*) has an acute apex at its inner distal corner, and beneath this a small, blunt lobe; the teeth at the base of the inner margin are somewhat short and strong. In the *maxilla* (fig. 79) the cardo and stipes are of the usual form; the galea (fig. 72 *g*) has a delicate lobe surrounding its apex, and the palp is very small (fig. 79 *p*), with a strong, straight bristle. The head of the lacinia (figs. 79 *l*, 80, 81) is almost circular in outline, its three outer teeth (figs. 80, 81 *t*) hardly projecting beyond the edge of the evenly rounded lamellae, which are supported by series of radially arranged bristles. The *tongue* (fig. 79 *hy*) has conspicuous rounded distal lateral lobes and a pair of strong supporting ridges towards the centre; its foot (fig. 79 *pd*) and the supporting arm (fig. 79 *br.*) of the maxillula resemble those of other genera of the Entomobryidae.

CYPHODERINI.

The spring-tails of this tribe are blind, white insects, living in underground or concealed situations, such as caves, or the nests of ants and termites. Several genera have been described, and a useful synopsis of the group has lately been published by Börner ('13 *a*). The great majority of the known species belong to the widespread genus Cyphoderus Nicolet, in which must be placed the only representative of the group in the Seychelles collection.

Cyphoderus Nicolet.

This genus is characterized by the normal build of the head and the foot-claw (except for the excessively long basal tooth, see fig. 72 *b*), the presence of a very elongate lamella (fig. 72 *lm*) on the empodial appendage, eleven elongate scales (an inner row of five and an outer row of six), on the dens, and usually the great length of the mucro in proportion to the dens.

Cyphoderus insularum sp. nov.

(Plate XVII, figs. 71–73.)

Feeler half as long again as head, relative length of segments as 2 : 5 : 3 : 6 (fig. 71). Foot (fig. 72) with stout tenent hair, the claw with slender basal tooth (*b*), proximal teeth hardly apparent; empodial appendage (*em*) long, sharp, and curved, with acute basal lamella (*lm*). Spring half as long as body; manubrium slightly longer than dens and mucro together; dens half as long again as mucro (fig. 73), which has a small upturned apical tooth and two stout dorsal teeth. Inner distal scale of dens (fig. 73 *sc*) from two-thirds to four-fifths the length of mucro.

Length 1 mm. Colour white.

Localities.—Praslin : Vallée de Mai, "swarming among termites—probably *Arrhinotermes canalifrons* (Sjöst.)—in fallen log" (December, 1908). Mahé : Cascade, 1000 feet (three specimens, 1908).

In the form of the mucro and its proportion to the long dental scale this species resembles *C. bidenticulatus*, Parona (see Börner, 13*a*, p. 277), inhabiting ant and termite nests in Italy and South Africa; as well as *C. termitum* Wahlgren ('06, pp. 19–20), a termitophile from the Sudan, and (still more closely) *C. genneserae*, Carpenter ('13), from a salt spring near Tiberias. In the Seychelles insect, however, the mucro is of excessive length as compared with the dens. As regards the structure of the foot-claw, *C. insularum* is like the European *C. albinos* Nicolet in the absence of internal teeth.

NOTE.

A full set of the specimens described in this paper is deposited in the British Museum (Natural History). A large number of duplicates are in the Cambridge University Museum, and some—through Prof. Gardiner's kindness—are in the National Museum, Dublin.

DISTRIBUTIONAL NOTES.

In concluding this account of the Apterygota of the Seychelles, some remarks as to the indications afforded by the geographical range of the species or their near allies may be appropriate. There are thirteen species of Thysanura and eighteen of Collembola recorded from the Seychelles archipelago proper and the neighbouring islands of the Indian Ocean. In the first place, it is necessary to tabulate the distribution of these species within the area itself.

I. Seychelles Group.

M. = Mahé. S. = Silhouette. P. = Praslin. B. = Bird Isl. F. = Félicité.

Thysanura.

Corethromachilis Gardineri—M.S.P.
C. brevipalpis—M.S.
C. gibba—M.S.
Lepisma intermedia—M.F.
Isolepisma bisetosa—M.
Ctenolepisma longicaudata—F.
Acrotelsa collaris—M.B.
Atelura nana—M.
Lepidospora Braueri—M.
Iapyx silvestris—M.S.
Lepidocampa fimbriatipes—M.S.

Collembola.

Neanura sexoculata—M.S.
Isotomurus obscurus—M.S.
Heteromuricus longicornis—M.S.
Entomobrya seychellarum—M.S.
Lepidocyrtus obscuricornis—M.
L. silvestris—M.
L. annulicornis—M.
L. stramineus—M.
L. Fryeri—M.S.F.
Lepidocyrtus imperialis—M.S.F.
L. Gardineri—M.
Acanthurella Braueri—M.S.
Microparonella caerulea—M.
M. flava—M.
Cremastocephalus Scotti—M.
C. pallidus—M.
Cyphoderus insularis—M.P.

Eleven of the Thysanura and seventeen of the Collembola are thus known to inhabit the Seychelles archipelago in the restricted sense. Mahé, the largest of the islands, has ten of the Thysanura and all the seventeen Collembola; Silhouette has five Thysanura and seven Collembola; Félicité has two Thysanura (one—*Ctenolepisma longicaudata*, probably an introduced species—not found in any other island) and two Collembola; Praslin has one of each order; finally, from Bird Island has been collected nothing except the single Thysanuran *Acrotelsa collaris*, a house-dwelling species, probably introduced by man.

II. COETIVY.

THYSANURA.

Acrotelsa collaris.

III. AMIRANTE AND FARQUHAR GROUPS.

THYSANURA.

Isolepisma bisetosa. Eagle Isl. (Amirante), Cerf and Providence Isls. Farquhar.

IV. ALDABRA.

THYSANURA.

Isolepisma bisetosa.
Acrotelsa collaris.
Acrotelsa elongata.
A. Scotti.

COLLEMBOLA.

Axelsonia thalassophila.

The poverty of the exclusively coral groups (Coetivy, Amirante, Farquhar, and Aldabra) in Apterygota is evident from the above lists (II, III, and IV), and is highly suggestive when compared with the fairly rich fauna of the granite islands of the Seychelles archipelago proper (I). The only Collembolan found outside these granite islands is *Axelsonia thalassophila*, from the coral Aldabra group—a reef-haunting insect already known from the east coast of Madagascar. This spring-tail may be regarded as at least a possible subject for "accidental" dispersal across sea-channels. According to Gardiner's conclusions, the present Aldabra group could never have formed part of any continental tract, and the transport of small insects by sea-birds is not to be dismissed as impossible. Still the presence of delicate shore-haunting animals on separated islets or analogous stations is strongly indicative of former continuity, or at least approximate continuity; and though Aldabra may be "oceanic," the ancient existence of continental islands in the vicinity is certain. The presence of Axelsonia in Japan is noteworthy in this connexion, pointing to a former very extensive range of the genus.

The Isolepisma and the Acrotelsae found in the Amirante and Aldabra groups may have been introduced by means of human intercourse or commerce, as some at least of these species frequent the neighbourhood of dwellings, or live indoors. The contrast afforded to the scanty representation of the Apterygota on these coral islands by the comparatively rich fauna of Mahé and Silhouette, from one or both of which come all the Machilidae, Iapygidae, Campodeidae and (except for Axelsonia) all the Collembola of the collection, is most remarkable. It appears that the wingless insects of these islands are indeed evidence of former land-connexions, pointing, like the granite rocks, to ancient continental conditions. For if Apterygota be conveyed to any extent by "accidental" means of dispersal, how can the total absence of terrestrial Collembola from the coral islets be explained?

Comparison, from the distributional standpoint, of the Seychelles Apterygota with those of other countries is rendered difficult by the incompleteness of our knowledge of these insects in all tropical regions. Especially with regard to Madagascar—with which comparison would be of great interest—are the records disappointingly few; only three species of Collembola from the great island are included in Börner's recent paper ('07), while in Escherich's account ('10) of the Lepismidae only five Malagasy species are mentioned. In the lists below, in which the Seychelles Apterygota are grouped according to their known geographical affinities, actual specific identity is indicated by an asterisk.

GENERA PECULIAR TO THE SEYCHELLES.

Corethromachilis (its sub-family group, Machilinae, being widespread) 3 spp.

Microparonella (the most primitive genus of a tribe—Paronellini—with circumtropical range) 2 spp.

SPECIES OF WIDELY RANGING GENERA WITHOUT EVIDENT GEOGRAPHICAL AFFINITIES (7).

Isolepisma bisetosa.
**Acrotelsa collaris.*
Iapyx silvestris.
Isotomurus obscurus.
Entomobrya seychellarum.
Lepidocyrtus annulicornis.
L. stramineus.

SPECIES WITH ALLIES IN MADAGASCAR (2).

Acrotelsa Scotti.
**Axelsonia thalassophila* (also Japan).

SPECIES WITH ALLIES IN AFRICA (3).

**Acrotelsa nana.*
**Ctenolepisma longicaudata.*
Cyphoderus insularum.

SPECIES WITH ALLIES IN AFRICA AND INDIA (5).

Lepisma intermedia.
Lepidospora Braueri.
Lepidocyrtus Fryeri.
L. imperialis.
L. Gardineri.

Species with Allies in India and Ceylon (5).

Lepidocyrtus silvestris.
L. obscuricornis.
L. stramineus.
Heteromuricus longicornis.
Cremastocephalus pallidus.

Species with Allies in Malaya or Australia (3).

Acrotelsa elongata
(Australia).
Neanura sexoculata
Acanthurella Börneri
(Malaya).

Species with Allies in India, Malaya, or Japan and in Tropical America (2).

Lepidocampa fimbriatipes
(Malaya and America).
Cremastocephalus Scotti
(India, Japan, and America).

No very definite conclusions can be drawn from the facts of distribution just set forth, mainly because, with the incompleteness of our knowledge of the distribution of tropical Apterygota, it would be unwise to lay stress on negative evidence. With regard to the Seychelles archipelago itself, however, the apparent absence of the Symphypleona, the more highly organized sub-order of the Collembola, and of all Poduridae except one species, is noteworthy, indicating that the islands became separated from the great continental tracts before the majority of genera belonging to those groups had been able to spread far. A somewhat parallel case is afforded by the Apterygote fauna of the Sandwich Islands, from which also the Symphypleona seem to be absent, and the Arthropleona comprise only a single species of Poduridae (see Carpenter, '04) belonging to the same tribe as the Seychellean *Neanura sexoculata*, but to a more primitive genus, Protanura. It is noteworthy, also, that the dominant genus of Arthropleona in the Hawaiian archipelago, as in the Seychelles, is Lepidocyrtus, and that the other Collembola occurring in Hawaii are an Isotoma and two species of Entomobrya.

When the Apterygota of the Malagasy and Mascarene Islands shall have been well worked, there will be doubtless recognized many more species with affinity to Seychelles insects than the two mentioned above. The feature that comes out from the analysis with some clearness is the establishment of faunistic links between Africa, the Seychelles, and India; the range of some of the most remarkable of these, such as Lepidocampa and Cremastocephalus, stretch as far west as South America, and as far east as Java and Japan.

Similar geographical relationships are shown from the studies of various groups of insects and other terrestrial Arthropoda from the Seychelles, as recorded in the Reports of the Percy Sladen Trust Expedition (Gardiner and others, '07–'14).

Taking the Coleoptera (beetles) we find that, in his review of the Seychelles Curculionidae (*op. c.* V (XVI). pp. 393–497),[1] Champion mentions that out of 134 species, 100 are endemic, and the rest introduced, or showing affinity to African, Malagasy, or Ceylonese weevils. In different groups special affinity with the fauna of one or other of these regions is shown by the Seychelles insects. Thus Grouvelle finds (*l. c.*, pp 93–116) that of the Nitidulidae and Heteroceridae. seven species have affinity with Madagascar, one with Africa, and three with Ceylon and the Malayan Islands. Scott, after study of the Hydrophilidae and Histeridae (*l. c.*, pp. 193–235, pl. 14), finds that the Seychelles species have predominant affinity to those in Madagascar and Africa, much the same result being apparent among the Adephaga (*op. c.* IV (XV), pp. 239–262). In the Lamellicornia, however (*l. c.*, pp. 215–239), there are three distinct Oriental relationships to five African or Malagasy. The Oriental tendency is still more marked among the Pselaphidae, of which Raffray records (*op. c.* V (XVI), pp. 117–138, pl. 10) only one African, and one Indo-African, as compared with four Asiatic and seven Malayan affinities.[2] Turning to the Diptera, we find that the tropical distribution of most families is too imperfectly known for satisfactory analysis; but with regard to the Tipulidae, Edwards (*op. cit.* IV (XV), pp. 195–214. pls. 10, 11) reckons ten African against four Oriental species. Among the Lepidoptera, Fletcher (*op. cit.* II (XIII), pp. 265–324, pl. 17), dealing with the larger and more conspicuous moths and butterflies, mentions—in addition to many species with a very wide range—thirteen African and eleven Malagasy and Mascarene, as against four Indian and three Malayan species. On the other hand, Meyrick (*op. cit.* III (XIV), pp. 263–307), describing the more primitive Lepidopteran groups of the Tortricina and Tineina, distinguishes between an "ancient and highly specialized fauna" and "all the rest which might have been sporadically derived from the Indian region, excepting two or three which more probably originated in Africa." In many cases like the above, the more primitive orders or groups seem to show Oriental, and the more specialized, African affinities. Thus Burr states (*l. c.*, pp. 123–133), of the lowly Dermaptera (Earwigs) that the Seychelles species show distinctly more relationship with those of Ceylon than with the African. Bolivar and Ferrière (*op. cit.* IV (XV), pp. 293–300) point out that all the Seychelles Phasmidae show Indian, Malayan, or Australian affinities. And with regard to the Odonata (dragon-flies)—nine species of which had been collected by Wright ('69)—Campion (*op. cit.* IV (XV), pp. 435–446) finds that while the Aldabra and Assumption species are typically African, the Seychelles insects are predominantly Indian. Two Seychelles species are also Malagasy, two African, three both African and Indian, and five Oriental, while of the six endemic Seychelles dragon-flies, the three Zygoptera (demoiselles) have Asiatic, and the three Anisoptera (the more robust Libellulidae and Aeschnidae) have African affinities; most students of the dragon-flies would probably regard the Zygoptera as a more primitive tribe than the Anisoptera.

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[1] In these references the first volume no. refers to the Reports of the Percy Sladen Trust Expedition, the second (in brackets) to that of the *Trans. Linn. Soc. Zool.*, series 2.

[2] Kolbe (*Mitt. Zool. Mus. Berlin*, vol. v. 1, 1910), reviewing the beetle-fauna of the Seychelles before the Sladen Reports were available, dwelt on the predominance of the Oriental affinities.

Now it is noteworthy that the affinities of the Seychelles Apterygota are with Oriental more than with Ethiopian species, and as the Apterygota must be regarded as the most primitive of insects, the distribution of the allies of our Seychelles bristle-tails and spring-tails agrees well with the results obtained from the study of other groups. The establishment of such faunistic links, afforded by delicate insects like the Apterygota, incapable of flight, and living for the most part in concealed situations, is in full accord with the belief entertained by many naturalists, in the existence of a Mesozoic and early Cainozoic continental area joining the countries and archipelagoes now widely separated by the waters of the Indian Ocean. This subject has been discussed from the geographical standpoint by Gardiner ('06, '07–'14), who accepts Neumayer's suggestion of a continuous land tract in Mesozoic times from South Africa by way of Madagascar and the Seychelles to India and Ceylon, besides a wide continent stretching across the South Atlantic from Africa to America. Hirst (*op. cit.* V (XVI), p. 31) points out that the distribution of the scorpionid genus Lychas "is very suggestive of the former existence of continuous land between the Oriental region and the southern part of the African continent. In Cainozoic times the Seychelles archipelago must have formed part of the large insular or sub-continental tracts which then, as is generally agreed, occupied much of the area of the Indian Ocean. These geographical changes would explain how the elements of the Seychelles fauna are partly Oriental and partly African in their affinities. Most ancient of all the inhabitants are the purely endemic animals, or those whose range is very wide and discontinuous. Gardiner mentions the serpentine amphibians—the Caecilia—as vertebrate examples of this ancient element. They are matched by such Apterygote genera as Lepidocampa and Cremastocephalus, which tell—unless "accidental" means of dispersal can be supposed to account for their presence—of vanished land in the areas now covered by the Atlantic and Indian Oceans.

As to the details of these ancient land tracts, much difference of opinion has naturally been expressed. Wallace—as is well known to all students of animal distribution—argued ('92) strongly against the theory of a continuous continent across the Indian Ocean, even in Mesozoic times; and among the most recent writers on the subject, Sarasin ('10, p. 57) denies the probability of such a land area "in der späteren Kreidezeit und im Tertiär." Blanford, however, in his deservedly famous address ('90, pp. 88–99), while admitting Wallace's contention that the facts derived from mammalian and avian distribution afford but weak support to the theory, spoke convincingly in its favour from the range of lower vertebrates and of mollusca, as well as from the extent of ancient ocean-basins, as shown by the range of marine fossils. The great majority of modern students of distribution accept without hesitation the principle of such a continent. As examples of the support afforded to the theory by advance along different lines of inquiry may be mentioned Germain's study ('09) of the mollusca of equatorial Africa, and Ortmann's admirable essay ('02) on the distribution of freshwater Decapods.

With respect to the fauna of the Seychelles, the question whether the area of the archipelago maintained its latest connexion with Madagascar and Africa, or with India and Ceylon, is of much interest and difficulty. Ortmann (*l. c.*, p. 329) maintains that the connexion of Madagascar with India was interrupted before that with Africa, and a similar view is expressed in one of the maps illustrating Gardiner's paper ('06, p. 323), which shows an early tertiary Afro-Malagasy peninsula, in which the Seychelles are seen near the apex. Germain, on the other hand ('09. p. 172), imagines "une longue peninsule Indo-Malgache qui s'effondra, ne laissant plus subsister au début du tertiare qu'une chaîne d'îles assez rapprochées. Madagascar est complêtement isolé et n'aura plus, par la suite, que des communications temporaires avec l'Afrique." The series of maps given by Gadow ('13) seem to support in the main this latter view. In Perceval Wright's paper ('71) on the flora of the Seychelles, an outstanding feature is the description of a species of Nepenthes. This genus of "pitcher-plants" ranges from tropical Australia to Madagascar, and is—as Wright pointed out—unknown in Africa. Here again the Seychelles show affinity with the Oriental rather than with the Ethiopian region.

The Apterygota cannot be expected to throw much light on geographical details such as these, for our ignorance of extinct members of the group is very great. The predominance of Oriental species in the Seychelles fauna has already been emphasized, and it is remarkable that, with the exception of *Cyphoderus insularum*, the distinctively Ethiopian and Malagasy insects in our collection do not come from the Seychelles proper at all, but from the island groups to the west—Aldabra and Farquhar. Our knowledge of the Apterygota of Madagascar and the African continent is, however, far too incomplete to allow us to attach great importance to negative evidence on this aspect of the question. But so far as our present information goes, a study of the Seychelles Apterygota indicates that the latest continental connexion of the archipelago was with India and Ceylon rather than with Africa. That the ancestors of these wingless insects did reach their present habitations by means of continuous land-tracts is far more likely than that they were carried over wide seas by winds or on floating objects; and even Wallace, upholding though he does the theory of the permanence of oceanic basins, admits that the Seychelles are not typical "oceanic islands," and suggests their possible former connexion with Madagascar. Their springtails and bristle-tails seem to tell us plainly that they were once joined with India and Ceylon. At the same time, the absence from the fauna of many important groups, the specific distinctness of most of the insects, the presence of such an apparently primitive and annectant genus as Microparonella, and the elaboration of such highly modified and beautiful types of structure as are exhibited in the species of Corethromachilis, all support the conclusion that the islands have long been separated from any continental area.

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EXPLANATION OF PLATES.

THYSANURA, I-XIII.

PLATE I.

Corethromachilis Gardineri.

Fig. Scaling not shown.

1. Female, side view. × 5.
2. Male. Head, front view, showing eyes (*e*); median ocellus (*m. o.*), paired ocelli (*p. o.*); labrum (*lbr*); and base of right feeler. × 21.
3. Region from middle of flagellum of feeler. × 21.
4. Mandible (left) of female. *c*, condyle; *a*, apex; *m*, molar area; *ad*, ad^1, adductor muscles; *re*, retractor muscle. Viewed from behind. × 50.
5. Portion of tongue (*hy*) with its right peduncle (*pe*), and right maxillula (*Mxl*); *g*, galea; *l*, lacinia; *p*, palp. From female, front view. × 50.
6. Left maxilla of male, front aspect: *te*, tentorium; *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp. × 21.
7. Right maxilla of female: head of lacinia from behind, showing apical teeth (*t*), lamellae (*la*), lateral teeth (*t*), and "brush" (*br*) composed of lanceolate spines. × 84.
8. The same, viewed from within. × 84.
9. Left maxilla of male: inner edge of galea and apex of lacinia, front view. × 84. (Lettering same as in figs. 7 and 8.)
10. The same, outer corner of galea. × 84.
11. A sensory spine from galea. × 460.
12. Part of labium of male with left palp (*sm*, submentum; *m*, mentum; *p*, palp; *g*, lobes of galea; *l*, of lacinia). × 21.
13. Apex of labial palp with flattened sensory spines. × 230.
14. Male: shin and foot of hind-leg. × 21.
15. Coxal process of second leg. × 21.
16. Coxal process of third leg. × 21.
17. Tip of foot showing claws and scopula. × 125.
18. Extremity of a lanceolate spine of the scopula. × 460.

PLATE II.

Figs. 19–26, *Corethromachilis Gardineri*; 27–34, *C. brevipalpis.* Abdominal segments. Scaling not shown.

In all figures, *sm*, sternum; *s. c.*, sub-coxa; *st*, stylet; *e. v.*, exsertile vesicle; *go*, gonapophysis; *pe*, penis.

Fig.					
19.	*C. Gardineri.*	Male.	1st abdominal segment.		× 21.
20.	do.	do.	2nd	do.	× 21.
21.	do.	do.	3rd	do.	× 21.
22.	do.	do.	4th	do.	× 21.
23.	do.	do.	7th	do.	× 21.
24.	do.	do.	8th	do.	× 21.
25.	do.	do.	9th	do.	× 21.
26.	do.	do.	Distal parts of hind gonapophysis.		× 84.
27.	*C. brevipalpis.*	Male.	1st abdominal segment.		× 21.
28.	do.	do.	2nd	do.	× 21.
29.	do.	do.	3rd	do.	× 21.
30.	do.	do.	4th	do.	× 21.
31.	do.	do.	7th	do.	× 21.
32.	do.	do.	8th	do.	× 21.
33.	do.	do.	9th	do.	× 21.
34.	do.	do.	Anterior gonapophysis.		× 84.

Plate III.

Corethromachilis brevipalpis.

Scaling not shown.

35. Female. Head, front view, showing eyes (*e*), median ocellus (*m. o.*), paired ocelli (*p. o.*), labrum (*lbr*), and base of right feeler. × 21.

36. Region from middle of flagellum of feeler. × 21.

37. Mandible (left) of female: *c*, condyle; *a*, apex; *m*, molar area. Front view. × 50.

38. Tongue (*hy*) and left maxillula (*Mxl*), front view; *pc*, peduncle of tongue; *p*, palp; *g*, galea; *l*, lacinia of maxillula. From female. × 50.

39. Left maxilla of female, hinder aspect: *c*, cardo; *st*, stipes; *g*, galea; *l*, lacinia; *p*, palp. × 21.

40. Tip of galea and head of lacinia of same, showing apical teeth (*t*), lamella (*la*) with lateral teeth (t^1), and brush (*br*). × 84.

41. Part of labium of female with left palp (*p*); *s. m.*, sub-mentum; *m*, mentum; *g*, galea; *l*, lobes of lacinia. × 21.

42. Coxal process of second leg of female. × 21.

43. Hind-leg of female: *c*, coxa; *pr*, coxal process; *tr*, trochanter; *fe*, thigh; *ti*, shin; *ta*, segments of foot. × 21.

44. Tip of foot, showing claws (*cl*) and scopula (*sc*). × 125.

PLATE IV.

Corethromachilis gibba.

Scaling not shown.

Fig.
45. Male, side view. × 5.
46. Head of male, front view, showing eyes (*e*), median ocellus (*m. o.*), and paired ocelli (*p. o.*). × 21.
47. Head of male, side view. × 21. (Lettering as in fig. 46.)
48. Region from middle of flagellum of feeler. × 37.
49. Left mandible of female: *c*, condyle; *a*, apex; *m*, molar area. × 50.
50. Tongue (*hy*) and left maxillula (*Mxl*) of female, front view; *pe*, peduncle of tongue; *p*, palp; *g*, galea; *l*, lacinia of maxillula. × 50.
51. Left maxilla of female, front view: *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp. × 21.
52. Part of labium of female with right palp (*p*): *s. m.*, sub-mentum; *m*, mentum; *g*, galea; *l*, lobes of lacinia. × 21.
53. Coxal process of second leg of female. × 21.
54. Hind-leg of female: *c*, coxa; *pr*, coxal process; *tr*, trochanter; *fe*, thigh; *ti*, shin; *ta*, segments of foot. × 21.
55. Tip of foot, showing claws (*cl*) and scopula (*sc*). × 125.
56. Second abdominal segment of male: *sm*, sternum; *s. c.*, sub-coxa; *st*, stylet; *e. v.*, exsertile vesicles. × 21.
57. Third abdominal segment of male. × 21.
58. Sixth do. do. do. × 21.
59. Eighth abdominal segment of male (right half): *go*, left gonapophysis. × 21.
60. Left ninth abdominal sub-coxa (*s. c.*) and stylet (*st*), with penis (*pe*) and right gonapophysis (*go*). × 21.
61. Left anterior gonapophysis of male. × 84.
62. Left hind gonapophysis of male. × 84.

PLATE V.

Figs. 63–66. *Corethromachilis brevipalpis*, female. 67–70. *Lepisma intermedia.*

63. *Corethromachilis brevipalpis*, female. Eighth abdominal segment, ventral view, showing sub-coxa (*s. c.*), stylets (*st.*), and left gonapophysis (*go*). × 21.
64. Ninth abdominal episterna (*epst*), sub-coxae (*s.c.*), showing stylet (*st*) on left; abductor muscle (*abd*) and gonapophysis (*go*) on right side. × 21.

Fig.

65. Left gonapophysis of eighth abdominal segment, showing (A) attachment and segmentation near base, (B) near middle, and (C) at tip, adductor (*ad*) and extensor (*ext*) muscles. × 50.

66. Two scales from abdominal sub-coxae. × 210.

67. *Lepisma intermedia.* Male. Dorsal view. Scaling not shown. × 17.

68. Right sub-coxa (*s. c.*) and stylet (*st*) of ninth abdominal segment. × 116.

69. Tip of thigh (*fe*), shin (*ti*) and foot (*ta*) of hind-leg. × 116.

70 Sensory bristle from shin of hind-leg. × 580.

PLATE VI.

Isolepisma bisetosa.

Scaling not shown.

71. Male, dorsal view. × 8.

72. Face (*f*) and labrum (*lbr*). × 62.

73. A bifid bristle from the face. × 210.

74. Two scales from the body. × 210.

75. Right mandible, seen from behind: *c*, condyle; *a*, apex; *re*, retractor; *ad. p*, posterior adductor, and *ad*, median adductor muscles. × 62.

76. Apex (*a*) and molar area (*m*) of left mandible, front view. × 62.

77. Tongue (*hy*) and left maxillula (*mxl*); front view, *pe*, peduncle of tongue. × 62.

78. Right maxilla seen from the front: *c*. cardo; *st*, stipes; *g*, galea; *l*, lacinia; *p*, palp; *pr*, protractor; *ad*, adductor muscles; *l. m.* adductor of lacinia; *g. m.* of galea. × 62.

79. Labium with left palp. (*p*); *s. m.* sub-mentum; *m*, mentum; *g*, galea; *l*, lacinia. × 62.

80. Terminal abdominal segments of male, ventral view; *viii*, 8th sternum; *s. c.* 9th sub-coxa; *st*, 9th stylet; *pe*, penis. × 25.

81. Left sub-coxa of ninth abdominal segment, dorsal view (internal), showing base of stylet with muscles. × 62.

82. Terminal abdominal segments of female, ventral view: *vii*, *viii*, *ix*, stylets of 7th, 8th, and 9th segments; *go. viii* and *go. ix*, anterior and hinder gonapophyses; *s. c.* 9th sub-coxa. × 25.

PLATE VII.

Acrotelsa elongata, female.

Scaling not shown.

83. Dorsal view. × 8.

84. Left mandible, front view; *ad*, adductor muscle. × 58.

Fig.

85. Distal region of mandible, showing apex, molar area (*m*), and bifid bristles. × 168.
86. Right maxilla, from behind: *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp. × 58.
87. Extremity of galea and lacinia of maxilla. × 168.
88. Labium showing right palp (*p*); *s. m.* sub-mentum; *m*, mentum; *g*, galea; *l*. lacinia. × 58.
89. Edge of terminal segment of labial palp, showing sensory papillae (*s. p.*) × 168.
90. Terminal abdominal segments, ventral view; *viii*, *ix*, stylets of 8th and 9th segments; *s. c.* 9th sub-coxa; *go*, ovipositor. × 21.

PLATE VIII.

Figs. 91–100, *Acrotelsa Scotti*, female. Fig. 101, *A. collaris* (Fab.).

Scaling not shown.

91. *Acrotelsa Scotti.* Dorsal view. × 8.
92. Left mandible, front view. × 58.
93. Apex and molar area of mandible. × 210.
94. A feathered bristle. × 210.
95. Terminal abdominal segments, ventral view. *viii*, *ix*, stylets of 8th and 9th segments; *s. c.* 9th sub-coxa; *go*, ovipositor. × 21.
96. Part of right maxilla, from behind: *st*, stipes; *l*, lacinia; *g*, galea; *p*. palp. × 58.
97. Edges of terga of two adjacent abdominal segments, showing scars of dorsal and marginal combs. × 16.
98. Labium, showing right palp (*p*): *s. m.* sub-mentum; *m*, mentum; *g*. galea; *l*, lacinia. × 58.
99. Edge of terminal segment of labial palp, showing two of the sensory papillae (*s. p.*). × 375.
100. Terminal part of hind leg: *fe*, thigh; *ti*, shin; *ta*, foot-segments. × 58.
101. *Acrotelsa collaris.* Terminal segment of labial palp. *s. p.* sensory papillae. × 58.

PLATE IX.

Lepidospora Braueri Escherich.

Scaling not shown.

102. Female. Ventral view. × 8.
103. Face (*f*) and labrum (*lbr*). × 62.

Fig.

104. Right mandible, front view: *c*, condyle; *m*, molar area; *a*, apex; *re*, retractor muscle; *ad*, adductor muscles. × 62.
105. Distal portion of left mandible, hind view. × 62.
106. Tongue (*hy*) and right maxillula (*mxl*). × 84.
107. Right maxilla, seen from behind: *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp; *ad*, adductor muscles of stipes; *pr*, protractor of cardo. × 62.
108. Tip and inner edge of lacinia, showing apical teeth and comb-process (*c.p.*). × 210.
109. Extremity of comb-process of lacinia, internal view. × 366.
110. Tip of terminal segment of maxillary palp. *s.p.* sensory papillae; *s.r.* annular sense-organ. × 210.
111. Labium: *s.m.* sub-mentum; *m*, mentum; *l.* lacinia; *g*, galea; *p*, left palp. × 62. *A.* Sensory papillae on terminal segment. × 366.

PLATE X.

Lepidospora Braueri Escherich.

Scaling not shown.

112. Second leg: *cx*, haunch; *tr*, trochanter; *fe*, thigh: *ti*, shin; *ta*, segments of foot. × 42.
113. Tip of terminal foot-segment, showing claws and empodium (*em*). × 210.
114. Fifth abdominal sternum with stylets (*st*) and exsertile vesicles (*e.v.*). Muscles indicated on left side. × 42.
115. Terminal abdominal segments of young specimen, side view: *st* 8, *st* 9, stylets of 8th and 9th segments; *s. c.* 9, 9th sub-coxa. × 42.
116. Tenth tergum of adult male, ventral view, showing base of tail-process (*t.p.*), and apodeme (*ap*), and base of cercus (*ce*) on left side. × 42.
117. Terminal abdominal segments of female, side view. × 42.
118. Eighth abdominal segment of female with appendages, left half. Ninth right sub-coxa with stylet and gonapophysis, ventral view. × 42.

In figs. 117 and 118: *viii*, 8th abdominal sternum; *s. c.*, sub-coxa; *st*, stylet; *go*, gonapophysis, the numbers 7, 8, 9 indicating the abdominal segments.

119. Tip of right hinder (9th) gonapophysis, showing series of recurved hooks on inner ventral aspect. × 210.
120. Tenth abdominal tergum of female. × 42.

PLATE XI.

Iapyx silvestris.

Fig.

121. Head with left feeler (extended), and prothorax with right front leg, dorsal view; from Mahé specimen. × 58.

122. Head with left feeler (contracted), dorsal view; from Silhouette specimen. × 58.

123. Segments from middle region of feeler, showing the passage from contracted to extended condition. × 168.

124. Fourth, fifth, and sixth segments of feeler, ventral view, showing bothriotricha or "auditory" bristles (*s*). × 420.

125. Head, ventral view, showing labium: *g.* gena; *m.* mentum; *l.* lobe (galea and lacinia fused?); *p.* labial palp. × 58.

126. First abdominal sternum of male: *st.* stylet; *v.* vesicle. × 58.

127. Sixth to tenth (*vi–x*) abdominal terga of male with open forceps, dorsal view. × 58.

128. Seventh abdominal sternum of male. × 58.

129. Eighth abdominal sternum of male with extruded genital plate (*g. p.*) and gonapophyses (*go*). × 58.

130. External reproductive organs of female, ventral view as protruded: *g. p.* genital plate; *l.* lobe; *g.* gonapophysis; *vl.* vulva; *spc.* spermathecal opening. × 168.

131. Papilla at tip of gonapophysis. × 620.

132. External male reproductive organs, ventral view, as extruded: *g. p.* genital plate; *go.* gonapophysis; *r.* ridge shielding aperture. × 168.

133. The same, dorsal view; the aperture (*g. a.*) showing through the translucent genital plate (*g. p.*). × 168.

134. Ninth and tenth (*ix. x.*) abdominal sterna of male with closed forceps. × 58.

PLATE XII.

Lepidocampa fimbriatipes, female.

Scaling not shown except in fig. 148.

135. Ventral view: *go*, gonapophyses. × 33.

136. Right half of head and pronotum, with seven proximal segments of feeler, dorsal view: *su*, epicranial suture; *s*, "auditory" bristles × 62.

137. One of the "auditory" bristles from feeler. × 590.

Fig.

138. Antennal organ at apex of terminal segment of feeler. × 590.

139. Edge of pronotum with pinnate bristles. × 210.

140. A scale from the thorax. × 210.

141. Right mandible, ventral view. × 92.

142. Tip of mandible, showing apical teeth: ridged molar area (*mo*) and lacinia (*l*). × 580.

143. Left maxilla, right maxillula (*Mxl*) and tongue (*Hy*), viewed from behind (the left maxilla removed to expose the maxillula): *c*, cardo; *st*, stipes; *g*, galea; *p*, palp; *pe*, peduncle of tongue. × 210.

144. Tip of maxillary galea, with spines and peg-like sense-organ. × 210.

145. Labium: inner portion of spinose lacinia (*l*), and palp (*p*). × 210.

146. Tip of hind-foot, showing paired claws (*cl.*), empodial claw (*emp.*), and fringed pulvilli (*pl.*). × 370.

147. Left stylet of first abdominal segment. × 210.

148. Left stylet of fourth abdominal segment. × 210.

149. Extremity of abdomen, dorsal view, showing hinder edge of tenth tergum and triangular telson (*te*). × 92.

150. The same, ventral view; the left half of the tenth sternum has been partly removed to expose the anal valve (*vl*); *te*, telson. × 92.

Plate XIII.

Lepidocampa fimbriatipes. Male (figs. 151–5). Female (figs. 156–7).

Scaling not shown.

151. Male, dorsal view. × 33.

152. Right half of labium, with part of presternum (*prst.*), and sternum (*st.*) of prothorax: *s. m.* sub-mentum; *m*, mentum; *l*, lacinia; *g*, galea; *p*, palp. × 168.

153. Sternum with left stylet of first abdominal segment. × 168.

154. Hinder abdominal segments (*vii–x*), ventral view: *st*, stylet; *e. v.*, exsertile vesicles; *vl*, anal valve; *ce*, base of cercus. × 62.

155. Male genital ducts and armature: *viii*, front edge of eighth abdominal sternum; *v. d.*, vas deferens; *d. e.*, ejaculatory duct; *g. p.*, genital plate. × 168.

156. Female external reproductive organs: *viii*, front edge of eighth abdominal sternum; *g. p.* genital plate; *go.* gonapophysis; *spc.* spermatheca. × 168.

157. Left maxillula (*Mxl*) with edge of tongue (*Hy*). × 250.

COLLEMBOLA, XIII–XVIII.

PLATE XIV.

Figs. 1–6, *Neanura sexoculata.*

Fig.

1. Left half of head, dorsal view, showing feeler, ocelli (*oe*), post-antennal area (*p.a.*), labrum, right mandible (*mnd*), and left maxilla (*mx*, dotted *in situ*), tips of maxillulae (*mxl*), and tongue (*hy*). × 168.
2. Apex of fourth antennal segment, showing two retractile sense-papillae, sensory bristles, and short spines. × 250.
3. Right maxilla : *p*, palp. × 168.
4. Labium, ventral view. × 168.
5. Terminal segment of leg, showing claw and vestigial empodial appendage (*emp*). × 168.
6. Fourth, fifth, and sixth abdominal segments, dorsal view. On the fifth segment are marked the dorsal (*tb*), the intermediate (tb^1), and the dorso-lateral (tb^2) tubercles. × 62.

Figs. 7–14, *Axelsonia thalassophila* Börner.

7. Side view. × 46.
8. Left group of ocelli, with basal segment of feeler. × 210.
9. End of third and base of fourth antennal segment, with minute intermediate "jointlet"; sensory pegs (*s. p.*) near tip of third segment. × 210.
10. A sensory peg from third antennal segment. × 840.
11. Tip of fourth antennal segment with apical process. × 210.
12. Extremity of hind foot with claw (*cl.*), lateral process (*l. p.*), and empodial appendage (*emp*). × 370.
13. Catch, side view. × 370.
14. End of dens, and mucro of spring. × 370.

Figs. 15–19, *Isotomurus obscurus.*

15. Head, dorsal view, with left feeler. × 62.
16. Left group of ocelli, with post-antennal organ (*p. a.*). × 210.
17. Hind foot, with claw and empodial appendage. × 370.
18. Abdominal sensory bristle (bothriotrichum). × 370.
19. End of dens and mucro of spring. × 370.

Plate XV.

Figs. 20-24, *Heteromuricus longicornis.*

Fig.
20. Side view. × 16. Scaling not shown, but position of prominent bristles indicated.
21. Ocelli of left side, with base of feeler. × 168.
22. A few "jointlets" of third antennal segment, with whorl of feathered bristles. × 210.
23. Hind foot, with claw and empodial appendage. × 168.
24. End of dens, and mucro of spring. × 168.

Figs. 25–27, *Entomobrya seychellarum.*

25. Dorsal view. × 33.
26. Hind foot, with claw and empodial appendage. × 250.
27. End of dens, and mucro of spring. × 250

Figs. 28–30, *Lepidocyrtus sylvestris.*

Scaling not shown.

28. Head, feeler, and mesonotum, side view. × 62.
29. Hind foot. × 370.
30. End of dens, and mucro of spring. × 370.

Figs. 31–33, *Lepidocyrtus obscuricornis.*

Scaling not shown.

31. Side view. × 33.
32. Hind foot. × 250.
33. End of dens, and mucro of spring. × 250.

Figs. 34–36, *Lepidocyrtus annulicornis.*

Scaling not shown.

34. Side view. × 33.
35. Hind foot. × 250.
36. End of dens, and mucro of spring. × 250.

Figs. 37–39, *Lepidocyrtus stramineus.*

Scaling not shown.

37. Head, feeler, and mesonotum, side view. × 33.
38. Hind foot. × 168.
39. End of dens, and mucro of spring. × 168.

Plate XVI.

Scaling not shown.

Figs. 40–42, *Lepidocyrtus Fryeri.*

Fig.
40. Head, feeler, and mesonotum, side view. × 33.
41. Hind foot. × 250.
42. Mucro of spring. × 250.

Figs. 43–46, *Lepidocyrtus imperialis.*

43. Side view. × 33.
44. Ocelli of right side of head. × 168.
45. Hind foot. × 250.
46. End of dens, and mucro of spring. × 250.

Figs. 47–50, *Lepidocyrtus Gardineri.*

47. Side view. × 33.
48. Fore foot. × 250.
49. Hind foot. × 250.
50. End of dens, and mucro of spring. × 250.

Figs. 51–54, *Acanthurella Braueri.*

51. Side view. × 33.
52. Right group of ocelli. × 168.
53. Hind foot. × 250.
54. End of dens, and mucro of spring. × 250.

Plate XVII.

Figs. 55–58, *Microparonella caerulea.*

Scaling not shown.

55. Side view. × 58.
56. Ocelli of left side. × 370.
57. Hind foot. × 370.
58. Terminal part of dens, with mucro. × 370.

Figs. 59–62, *Microparonella flava.*

Scaling not shown.

59. Head, with feeler. × 58.
60. Tip of hind foot, with claw and empodial appendage. × 370.
61. End of ventral tube, with protusible sac (*v*). × 92.
62. Tip of dens, with mucro. × 370.

Figs. 63–66, *Cremastocephalus Scotti.*

Fig.

63. Side view, the right feeler regenerated. × 33.
64. Ocelli of left side, with base of feeler. × 168.
65. End of hind foot. × 370.
66 Tip of dens, with mucro (*m*) and scale-appendage (*a*). × 370.

Figs. 67–70, *Cremastocephalus pallidus.*

67. Side view of head and thorax, with basal antennal segment and fore and intermediate legs. × 33.
68. Ocelli of left side. × 168.
69. End of hind foot. × 370.
70. Tip of dens, with mucro (*m*) and scale-appendage (*a*). × 370.

Figs. 71–73, *Cyphoderus insularum.*

Scaling not shown.

71. Head and feeler. × 33.
72. End of hind foot: *b*, basal tooth of claw; *em*, empodial appendage; *lm*, its lamella. × 370.
73. Tip of dens from inner aspect and mucro (*m*), inner (*sc*) and outer (*sc'*) dental scales. × 250.

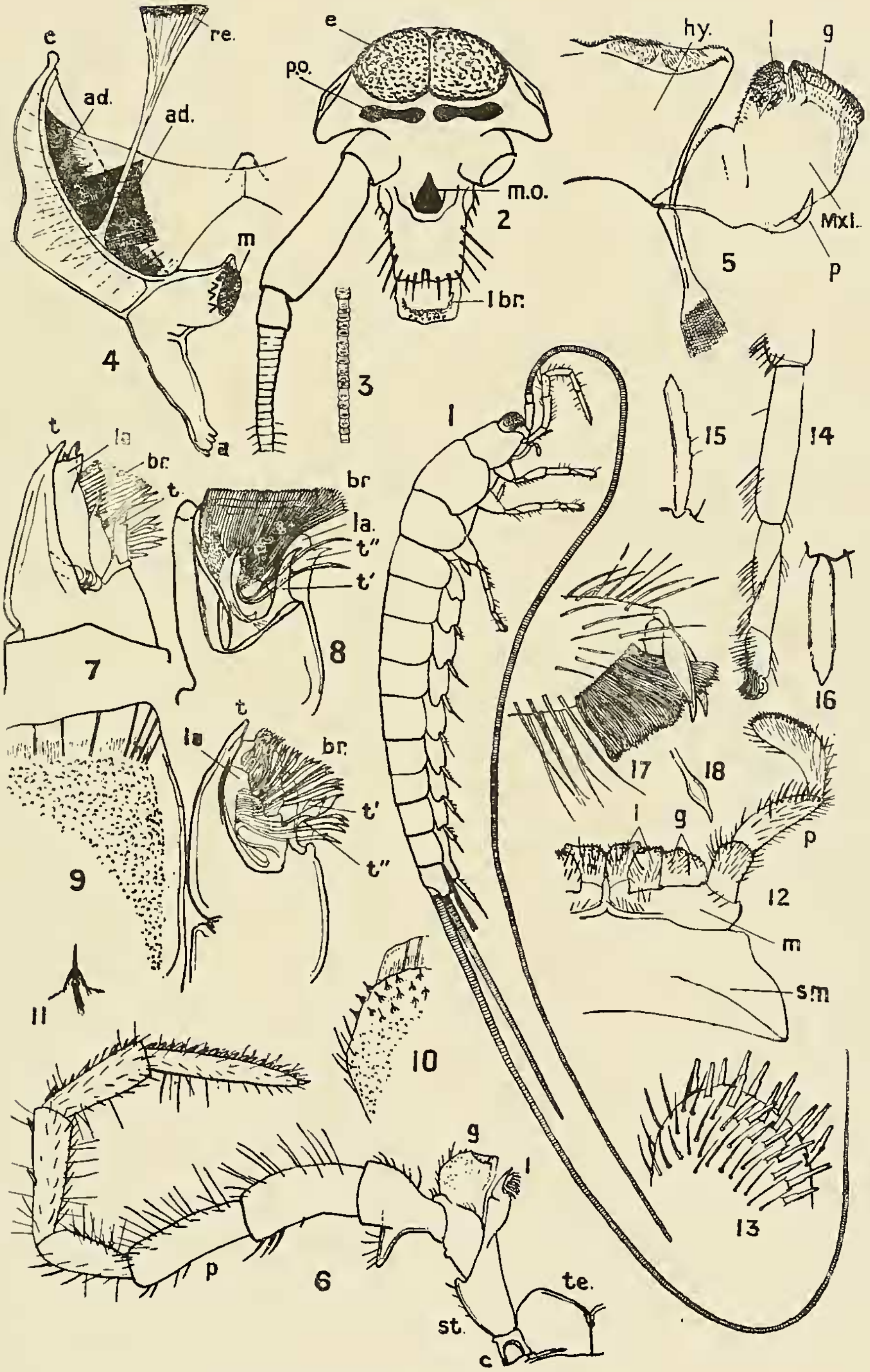
PLATE XVIII.

Figs. 74–77. Jaws of *Heteromuricus longicornis.*

74. Right mandible, front view: *a*, apical teeth; *m*, molar area; *c*, condyle. × 210.
75. Distal part of left mandible, hind view: *a*, apical teeth; *m*, molar area. × 210.
76. Left maxillula (*Mxl*), tongue (*hy*), and right maxilla: *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp; *pd*, right foot of tongue, front view. × 210.
77. Head of lacinia: *t*, teeth; *br*, brush; *lm*, lamellae. × 375.

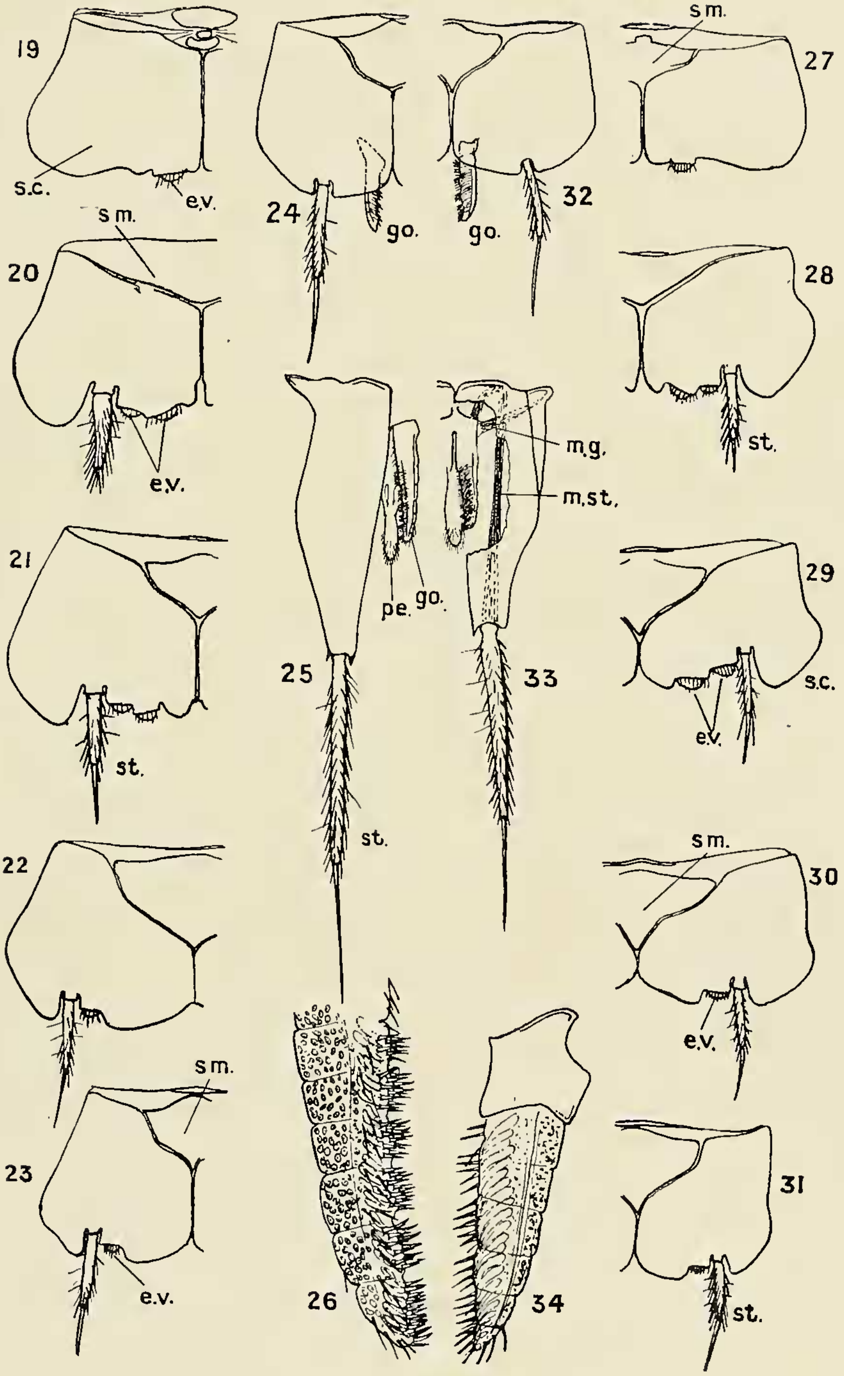
Figs. 78–81. Jaws of *Cremastocephalus pallidus.*

78. Right mandible, front view: *a*, apical teeth; *m*, molar area; *c*, condyle. × 370.
79. Left maxillula (*Mxl*), with its supporting arm (*br*); tongue (*hy*), with its right foot (*pd*); and right maxilla: *c*, cardo; *st*, stipes; *l*, lacinia; *g*, galea; *p*, palp. Front view. × 370.
80. Head of lacinia: *t*, teeth; *lm*, lamellae. Front view. × 750.
81. Head of lacinia, hind view. × 750.



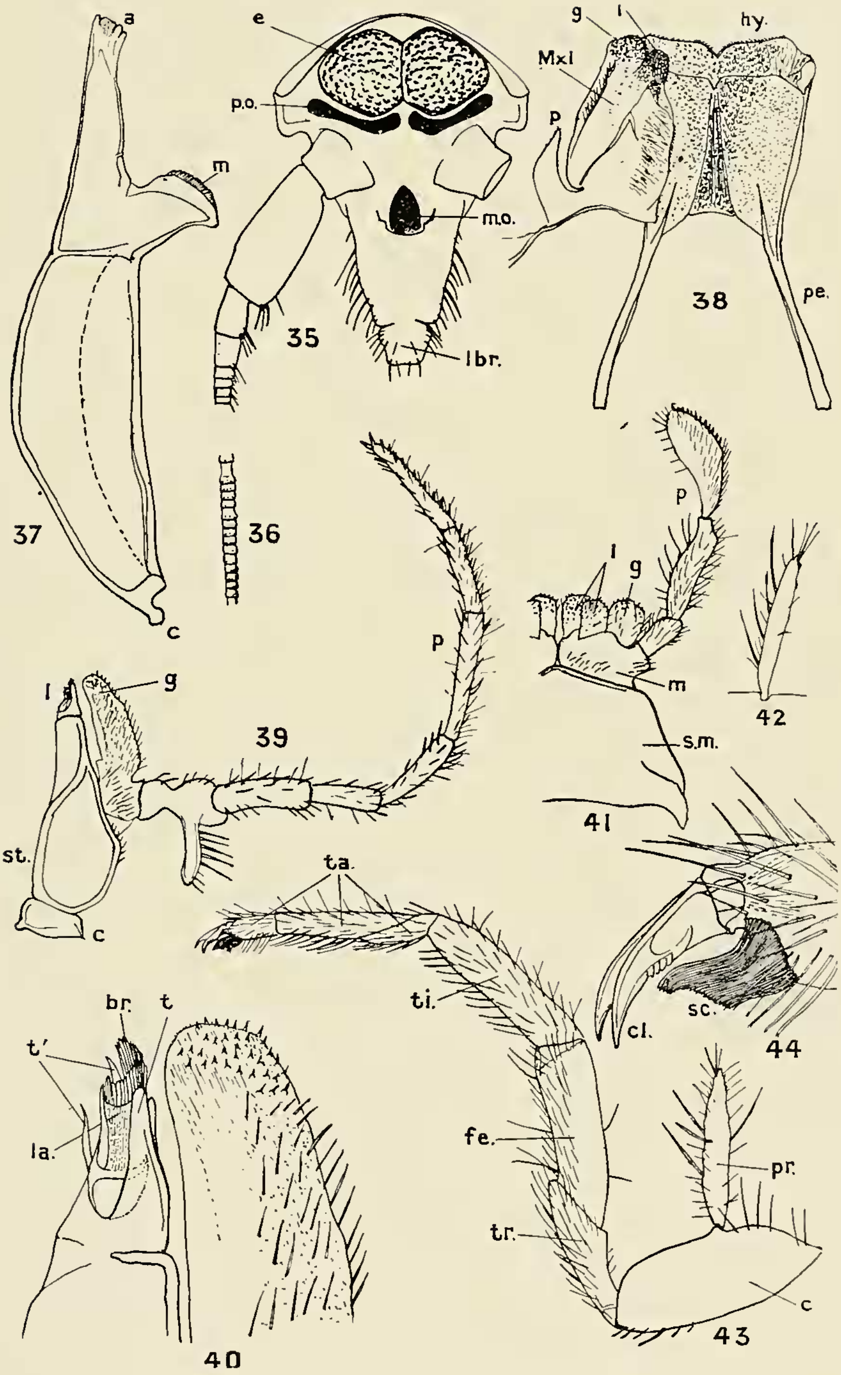
Carpenter.—Apterygota of the Seychelles.

Thysanura.



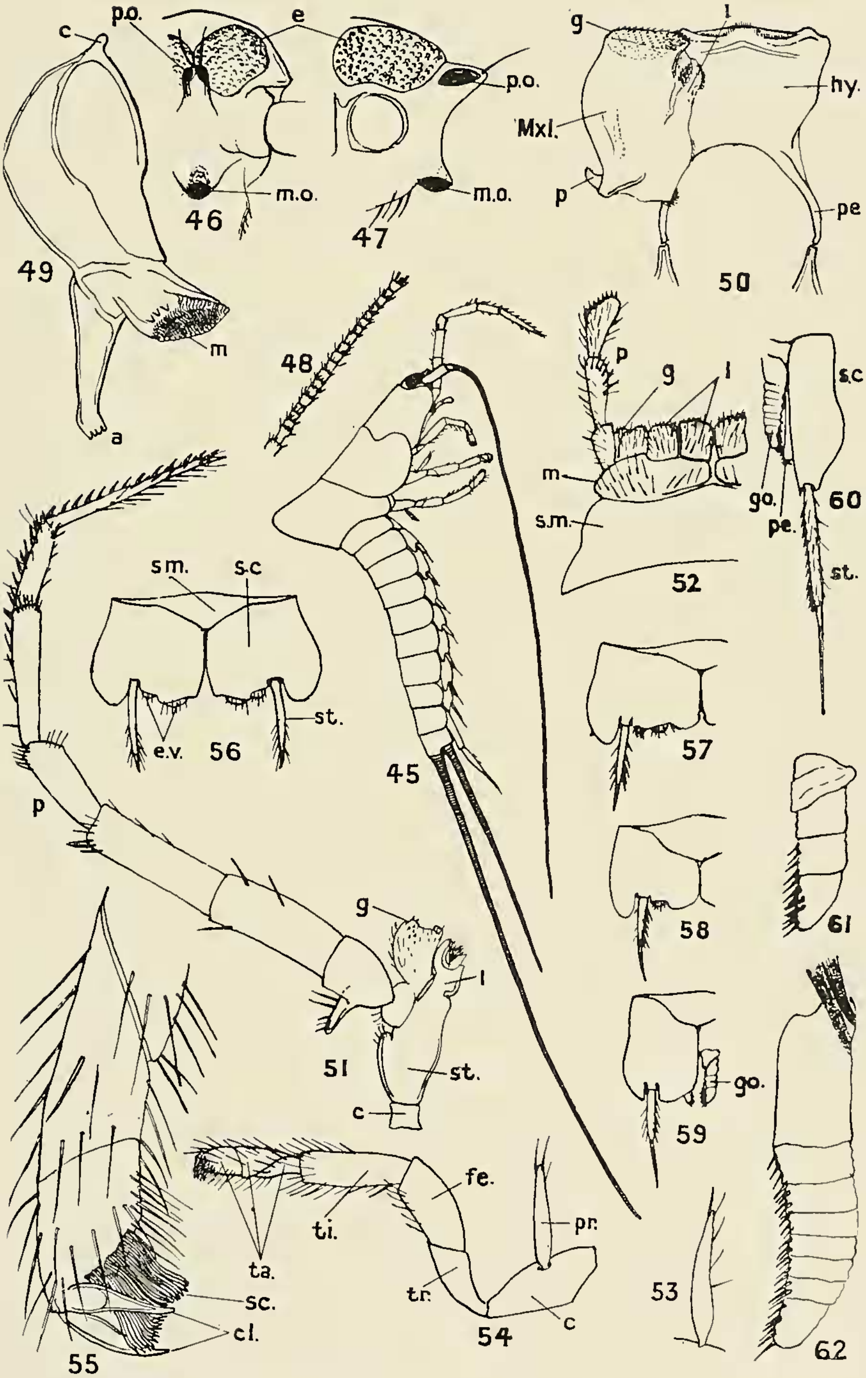
Carpenter.—Apterygota of the Seychelles.

Thysanura.



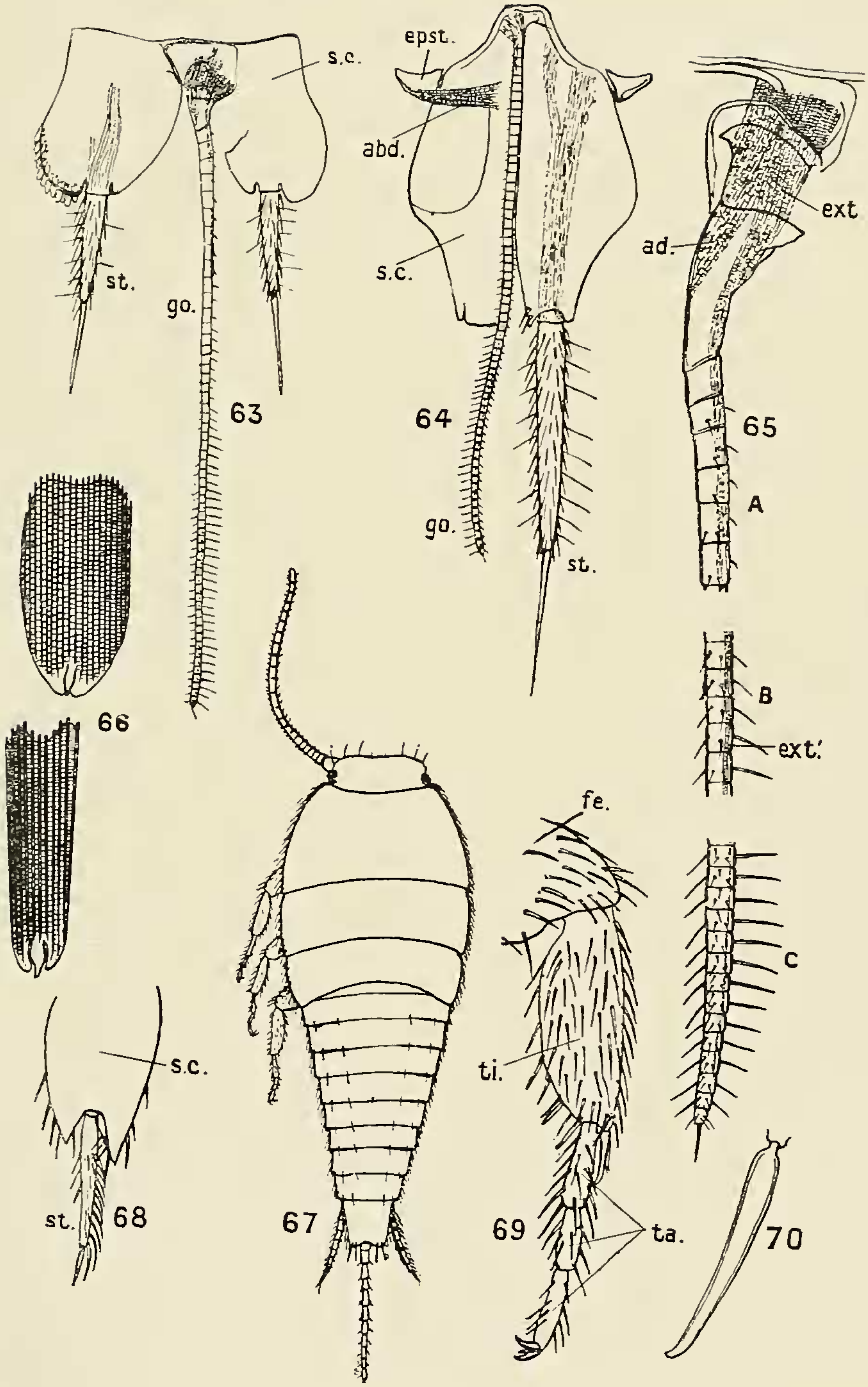
CARPENTER.—APTERYGOTA OF THE SEYCHELLES.

THYSANURA.



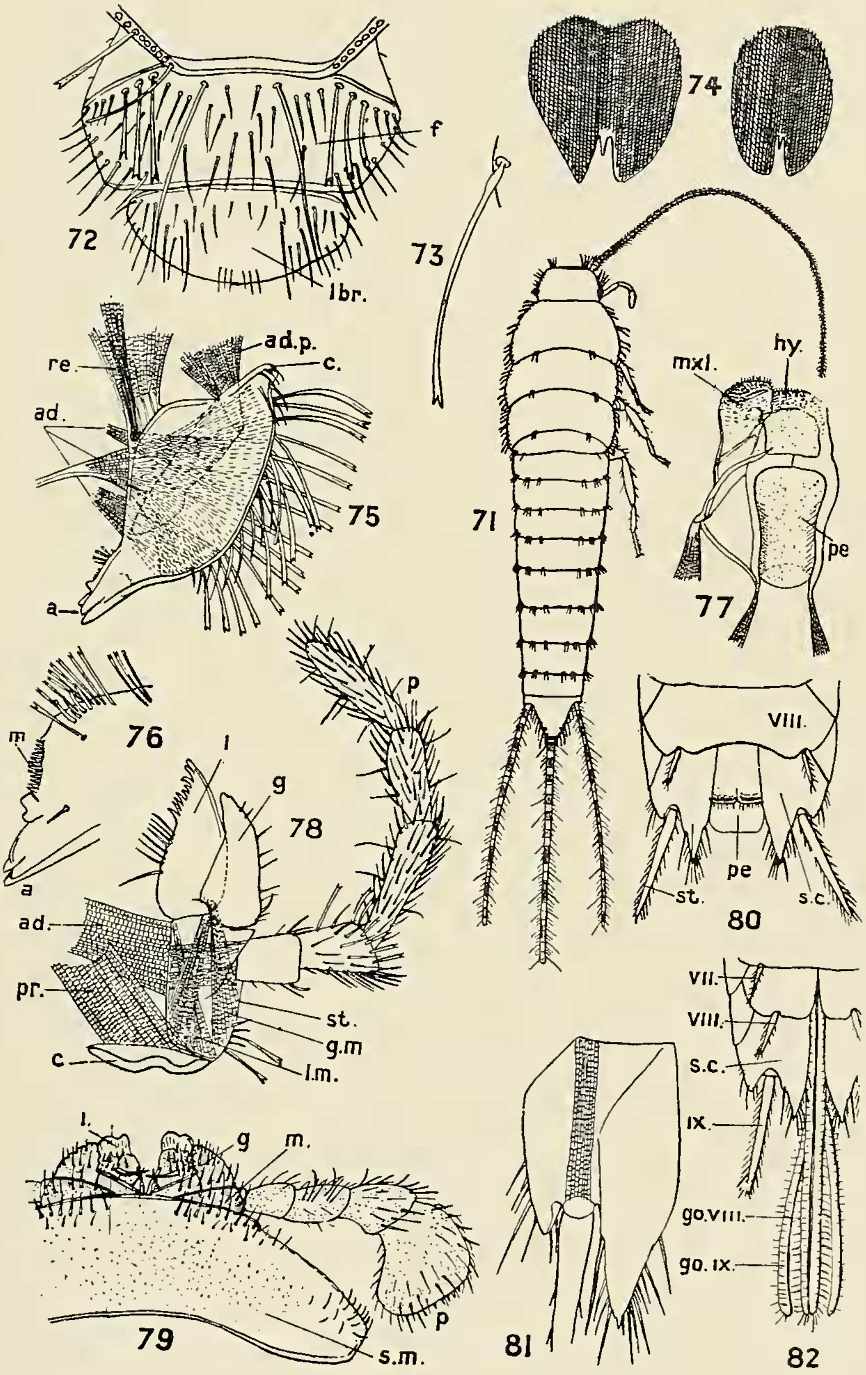
CARPENTER.—APTERYGOTA OF THE SEYCHELLES.

THYSANURA.



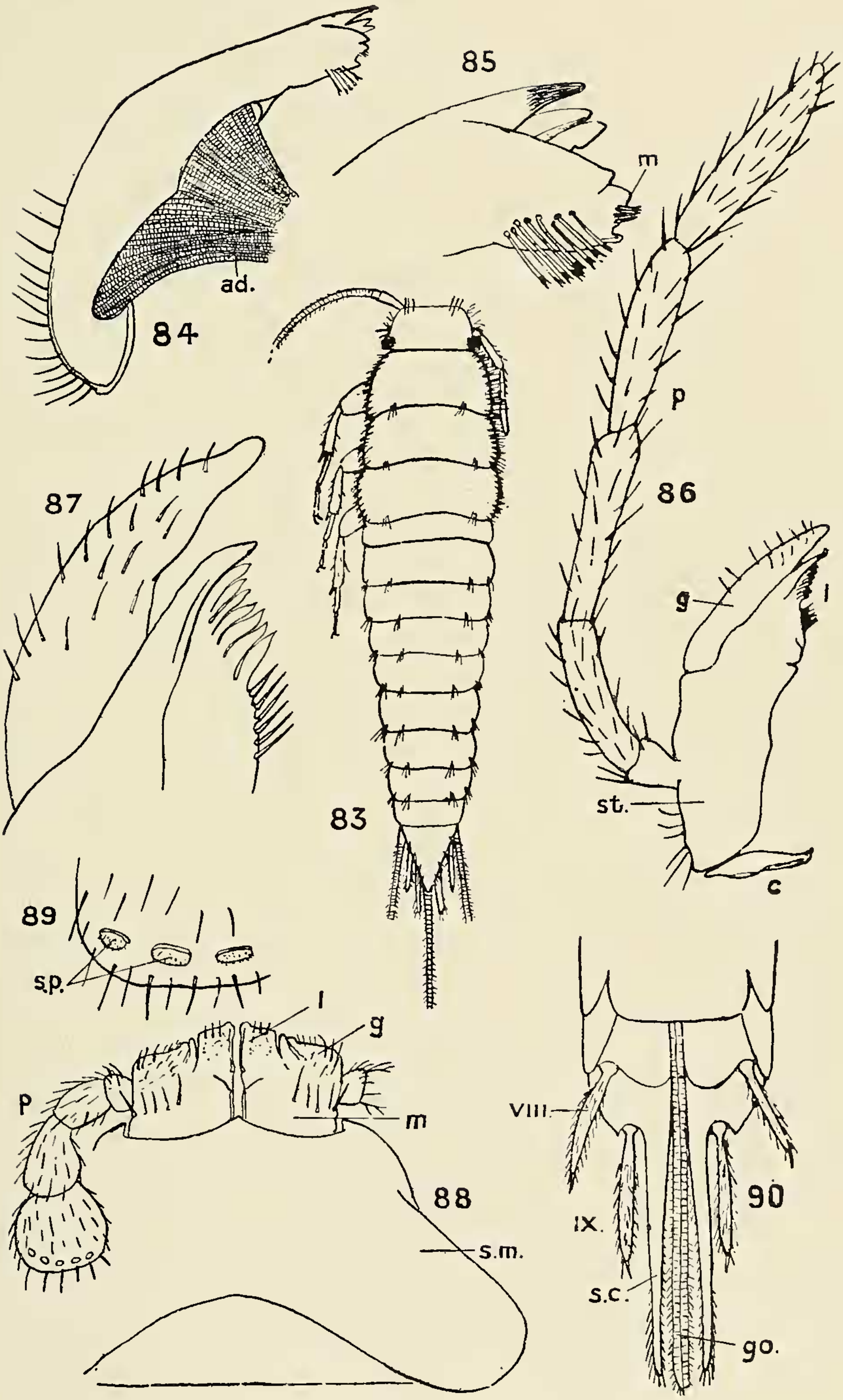
Carpenter.—Apterygota of the Seychelles.

Thysanura.



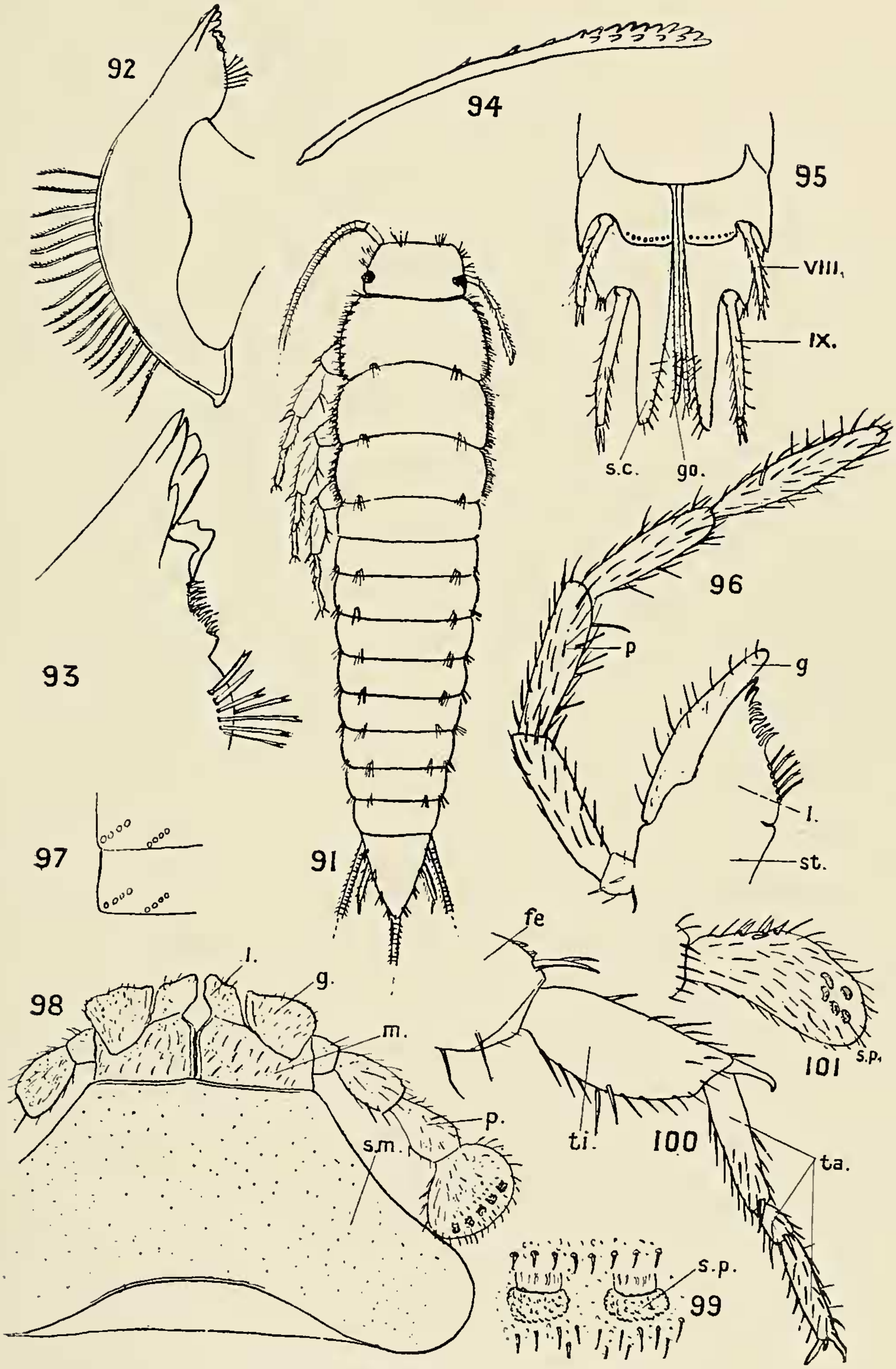
CARPENTER.—APTERYGOTA OF THE SEYCHELLES.

THYSANURA.



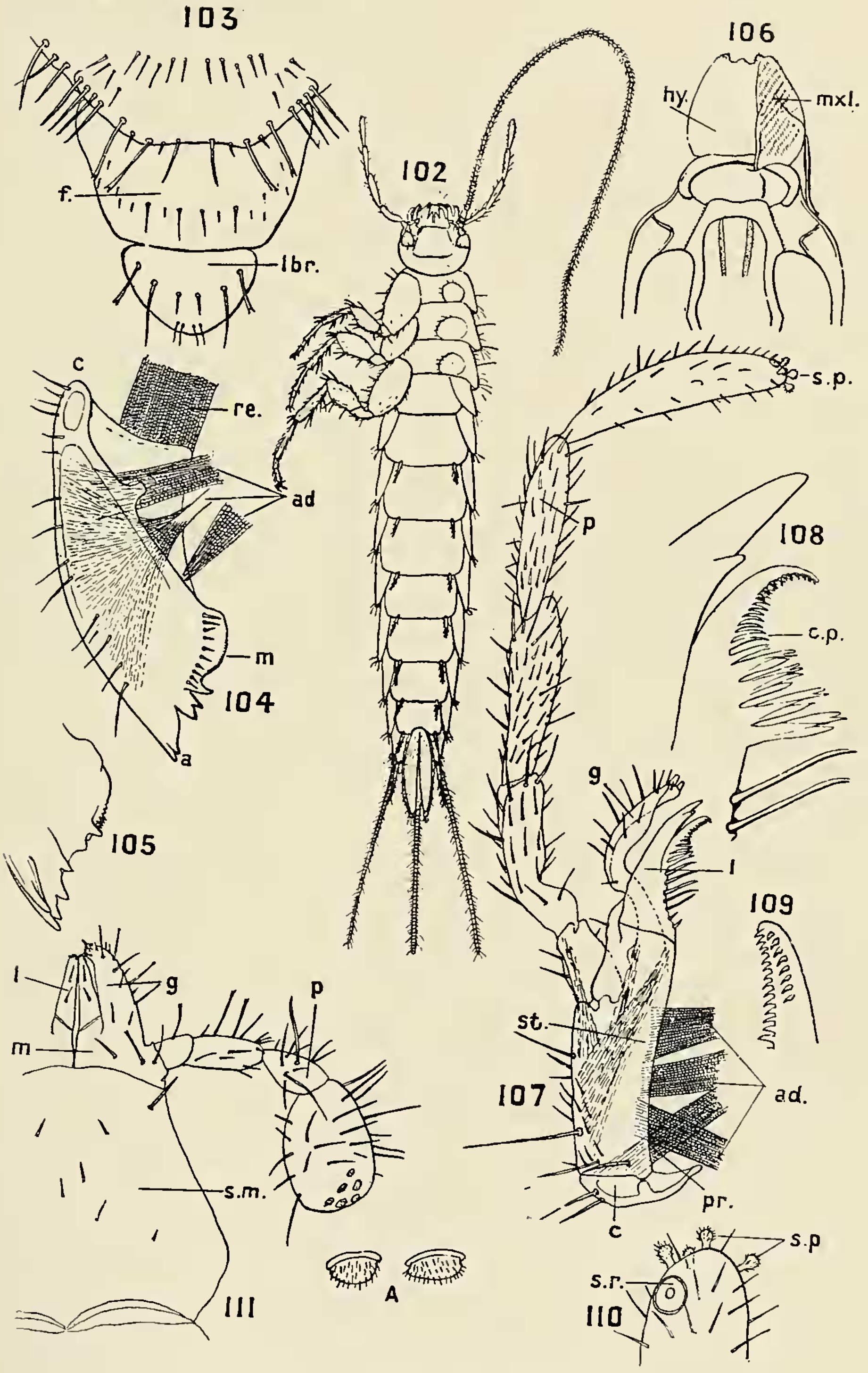
Carpenter.—Apterygota of the Seychelles.

Thysanura.



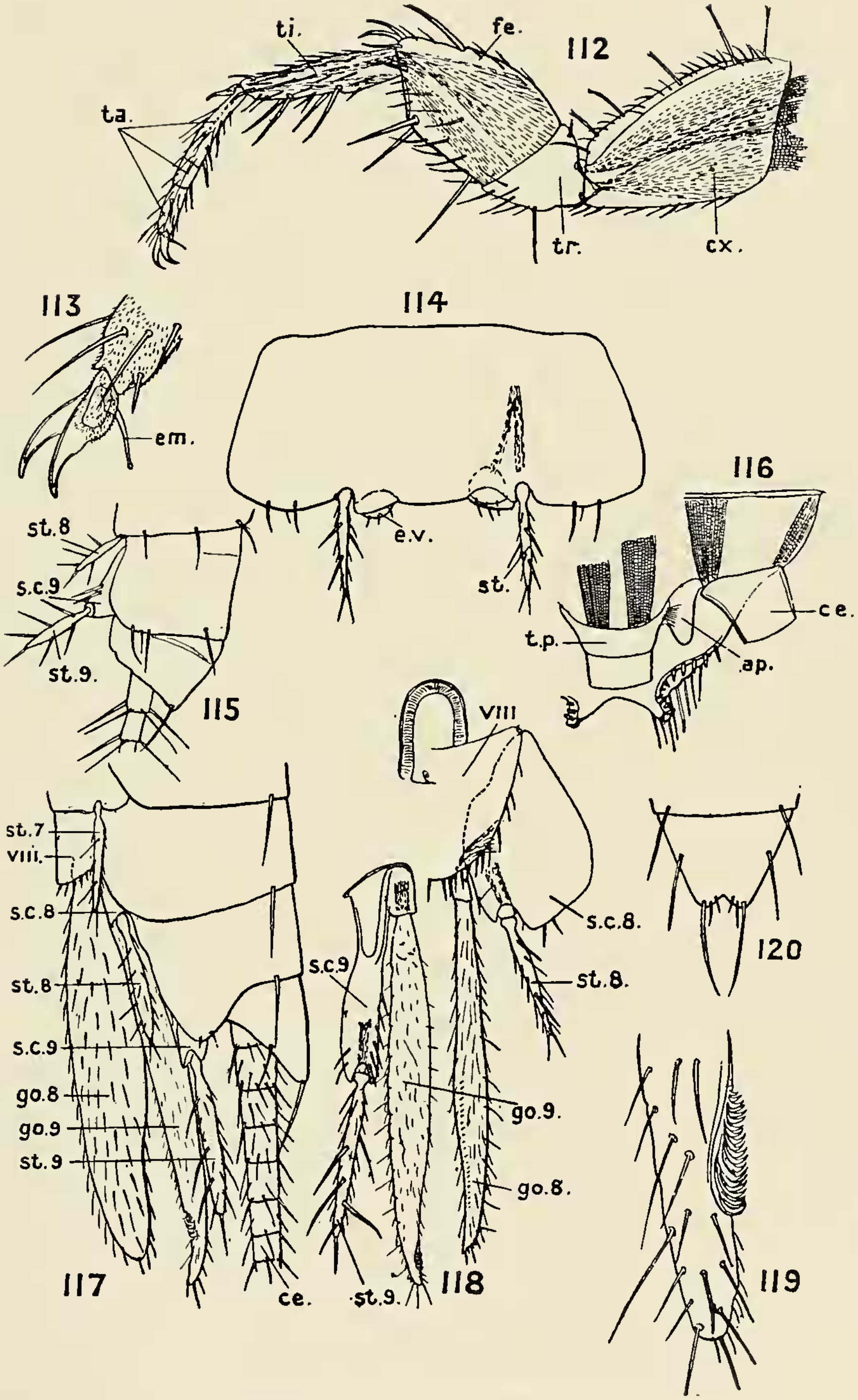
Carpenter.—Apterygota of the Seychelles.

Thysanura.



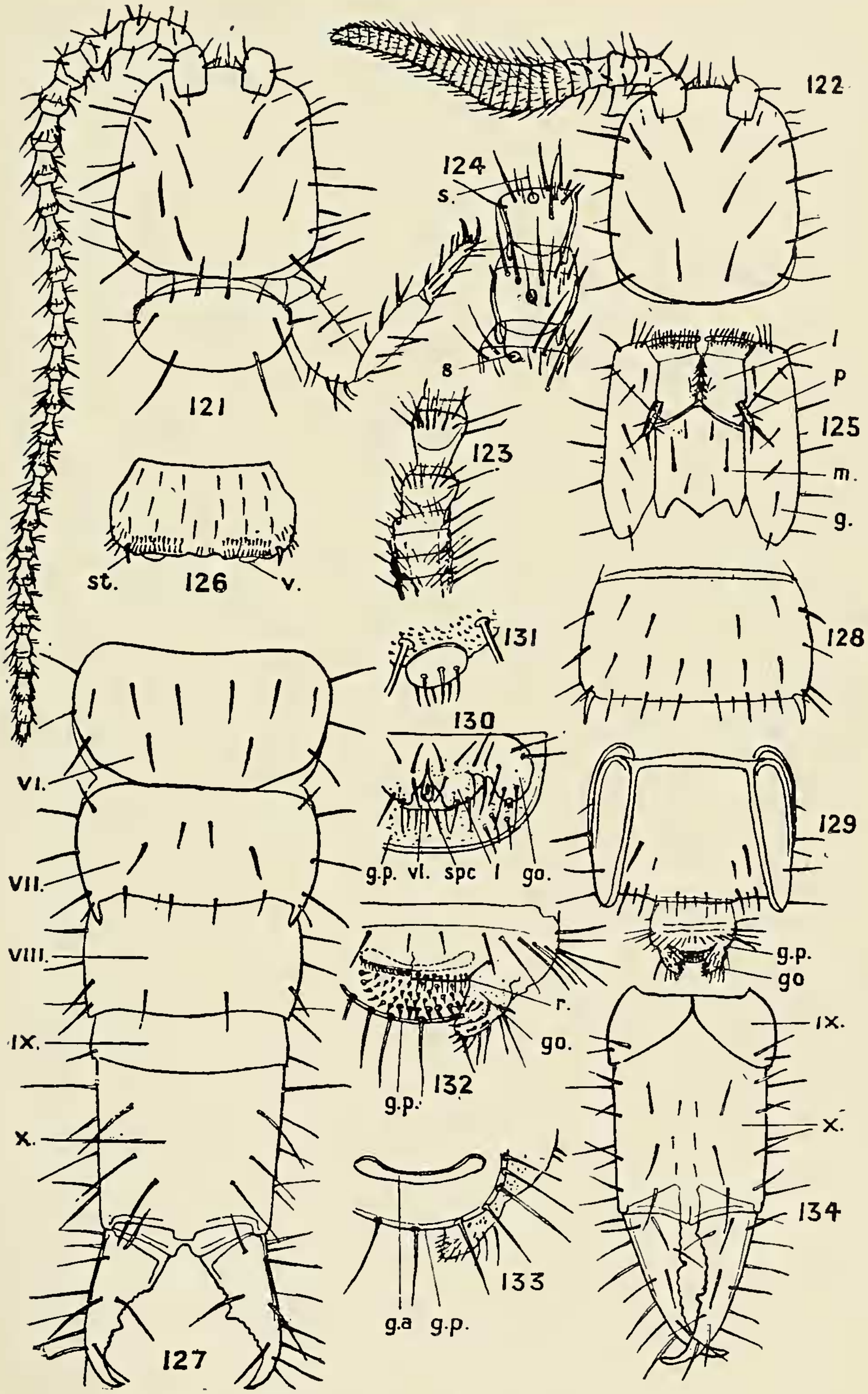
Carpenter.—Apterygota of the Seychelles.

Thysanura.



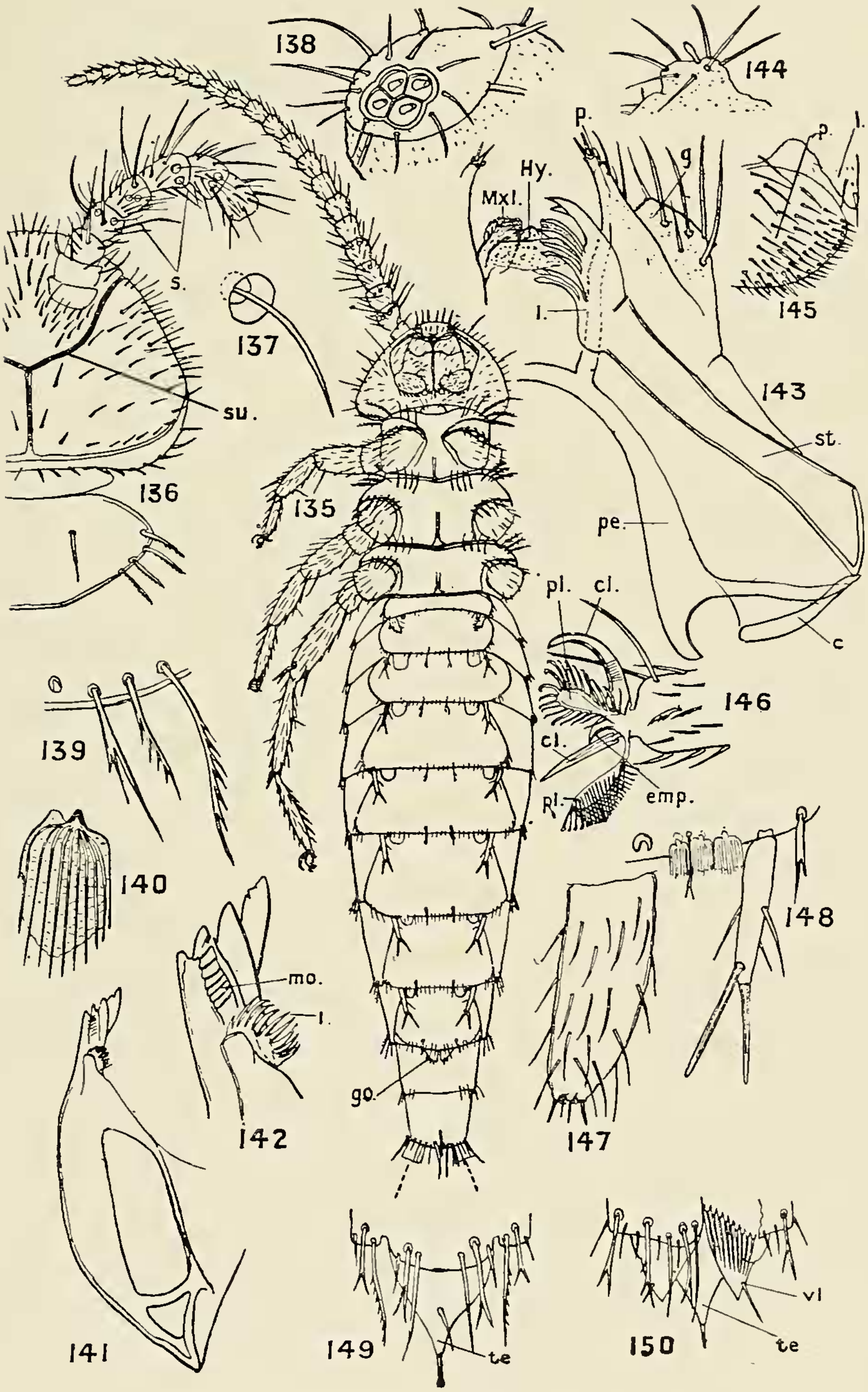
Carpenter.—Apterygota of the Seychelles.

Thysanura.



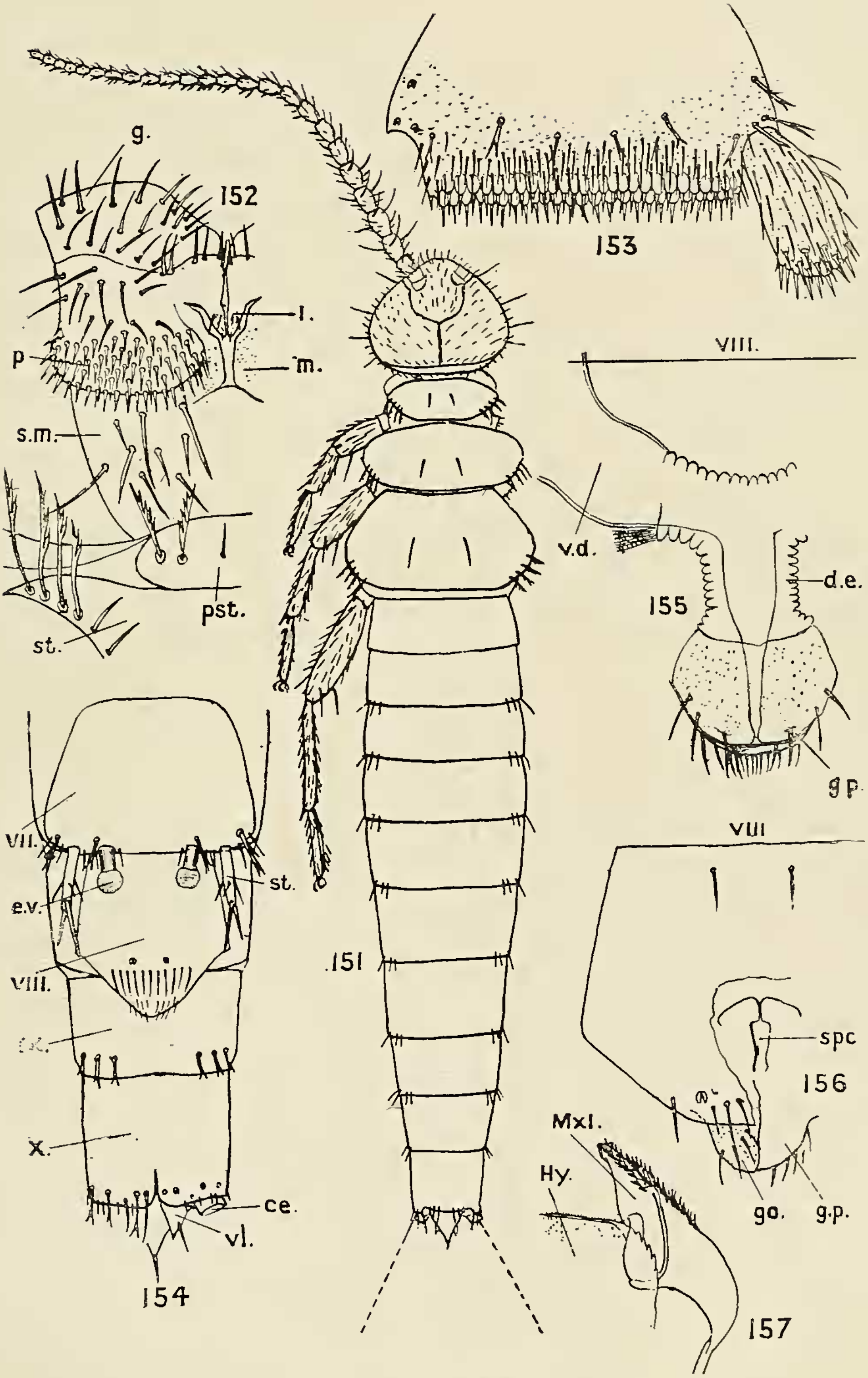
Carpenter.—Apterygota of the Seychelles.

Thysanura.



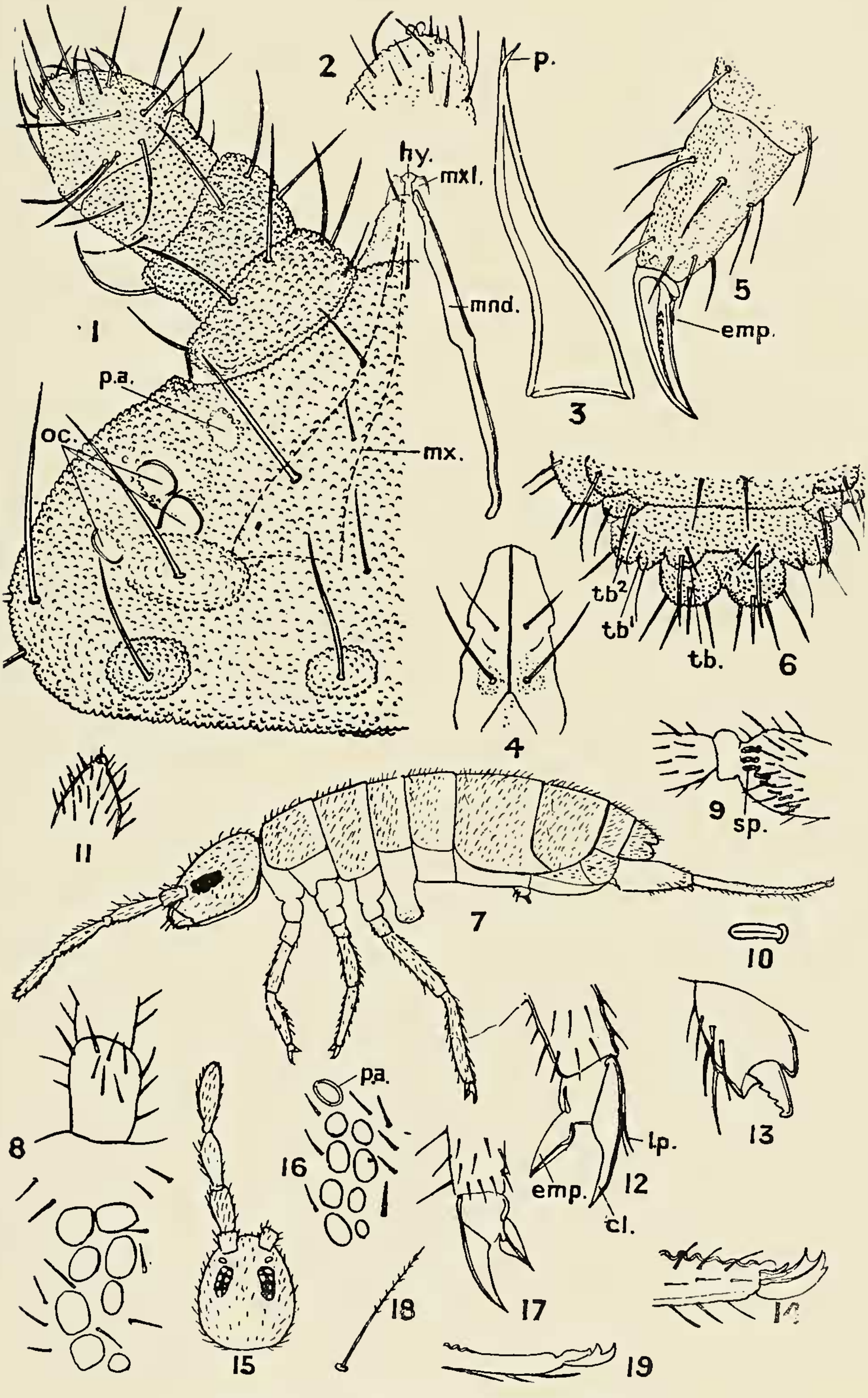
Carpenter.—Apterygota of the Seychelles.

Thysanura.



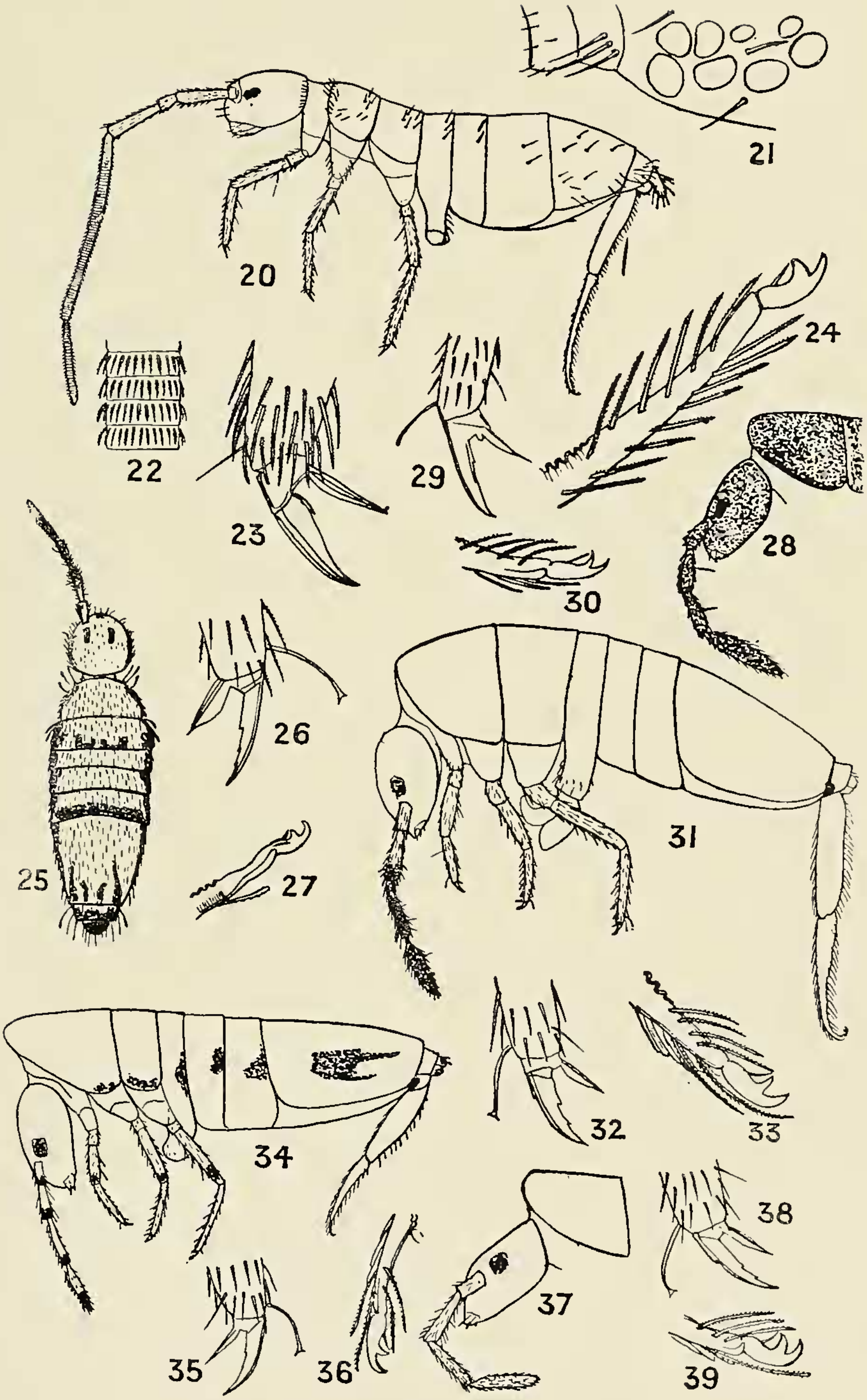
Carpenter.—Apterygota of the Seychelles.

Thysanura.



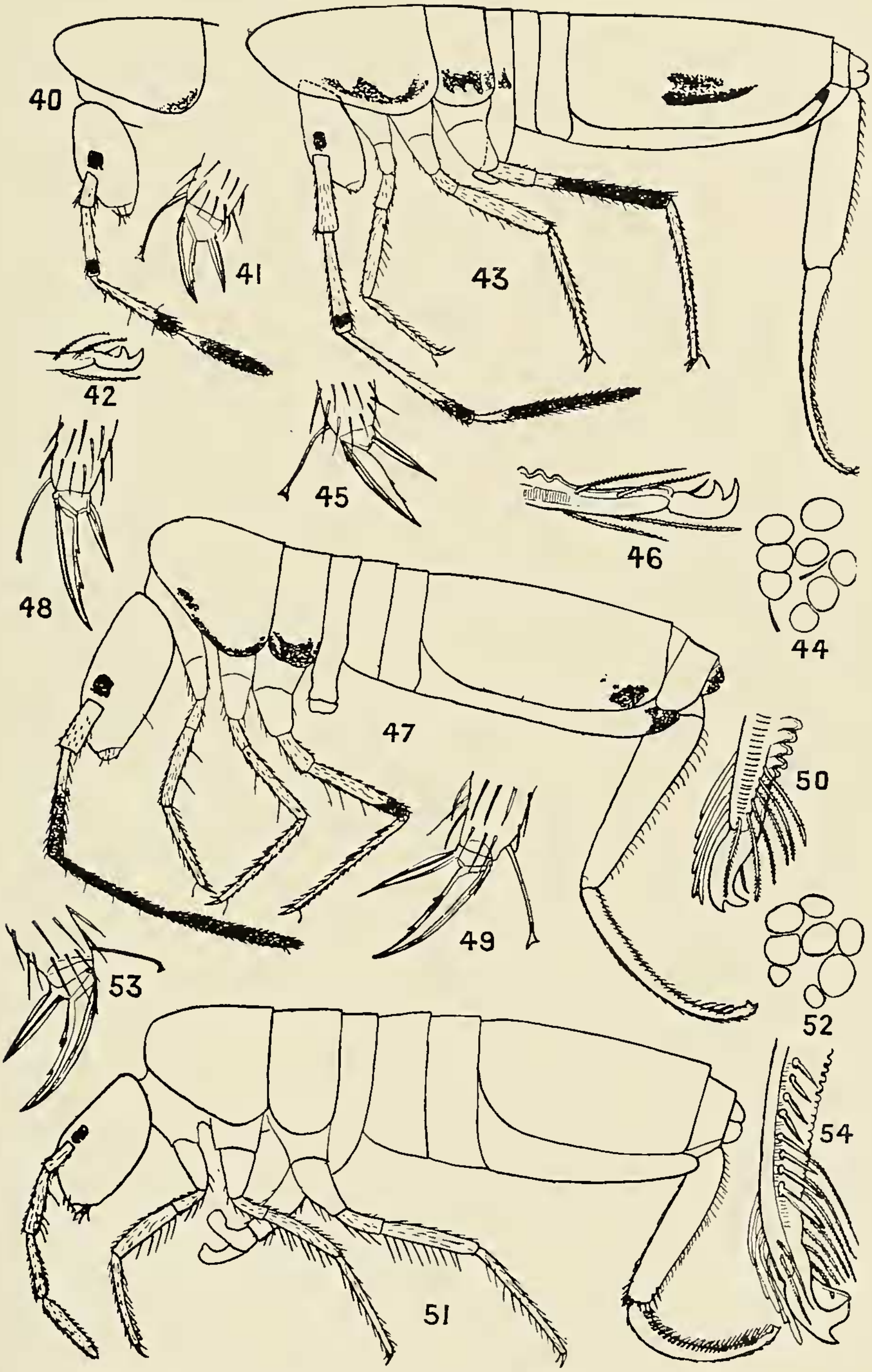
Carpenter.—Apterygota of the Seychelles.

Collembola.



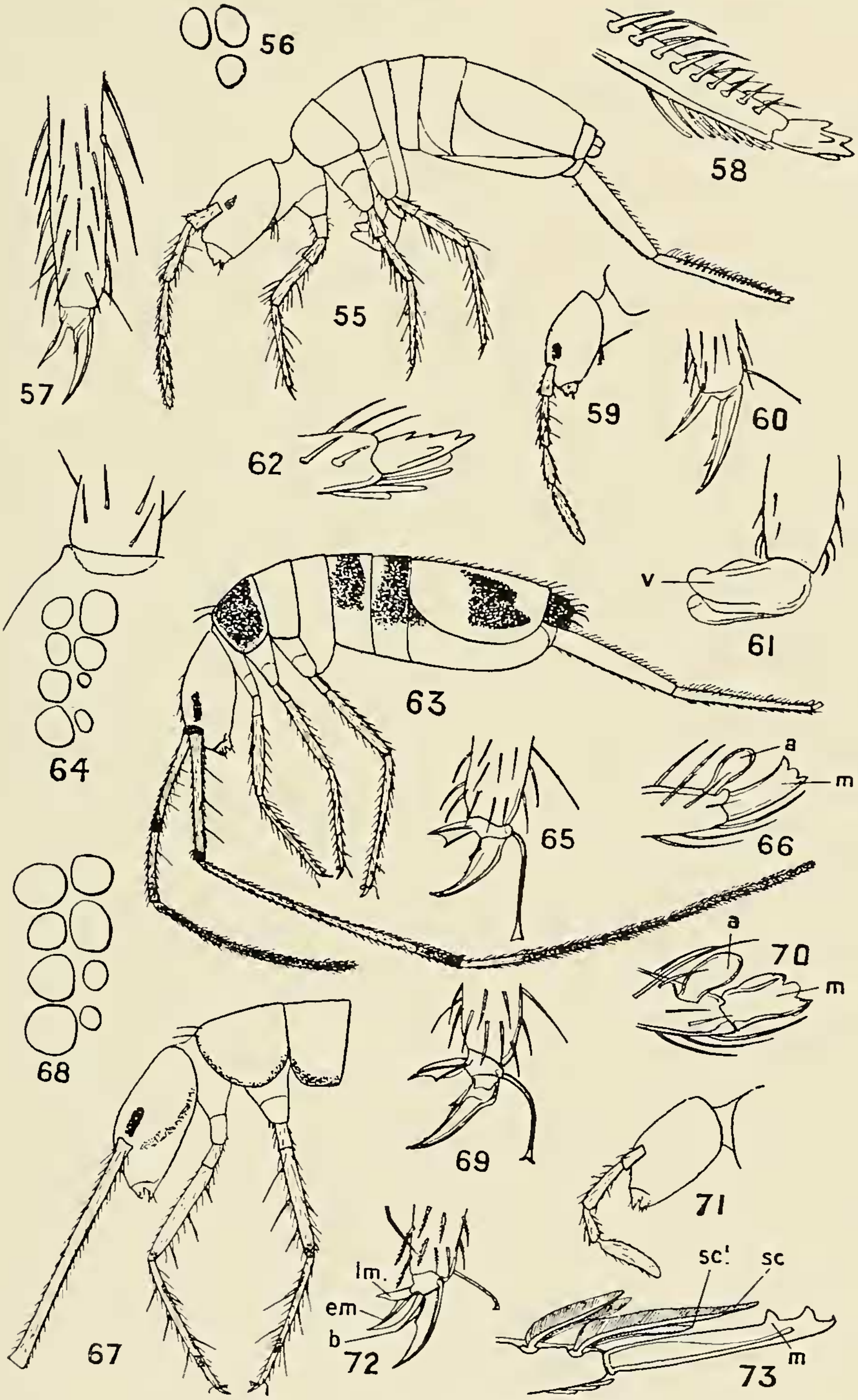
CARPENTER.—APTERYGOTA OF THE SEYCHELLES.

COLLEMBOLA.



CARPENTER.—APTERYGOTA OF THE SEYCHELLES.

COLLEMBOLA.



Carpenter.—Apterygota of the Seychelles.

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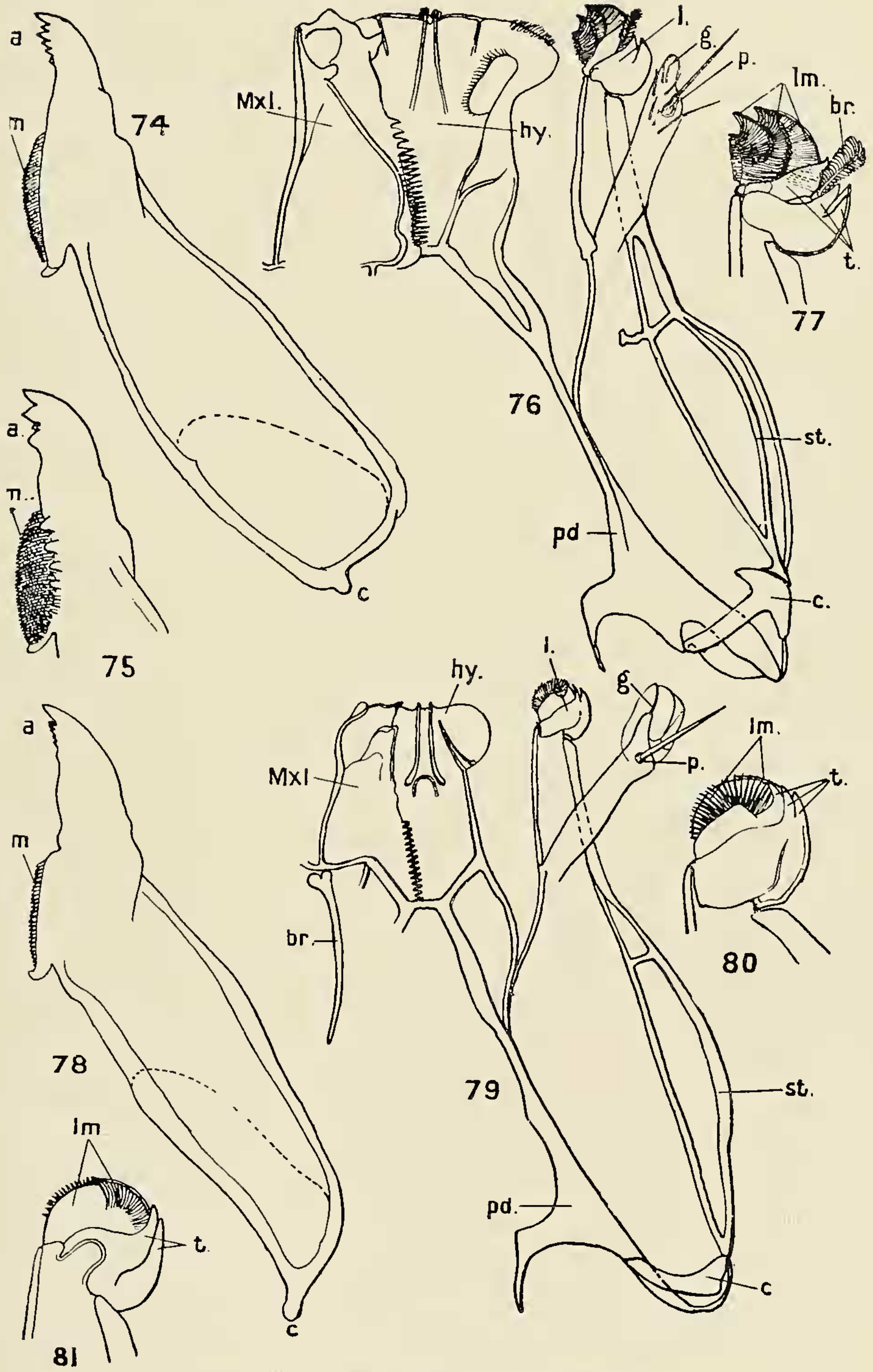

Carpenter.—Apterygota of the Seychelles.

Collembola.